Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

WE
DO WHAT IT TAKES TO
KEEP CANADA
AND CANADIANS
SAFE

CANADIAN NUCLEAR SAFETY COMMISSION | annual report 2011 to 12

CNSC CCSN

Canada

The Canadian Nuclear Safety Commission (CNSC) regulates all nuclear activity in Canada and is at the forefront of nuclear safety. We strive to ensure that Canadian nuclear activities are among the safest and most secure in the world.

The CNSC regulates all nuclear activity in Canada – from uranium mining to power generation, nuclear research, industrial and medical applications of nuclear materials, and waste disposal.

As leaders in our field, we are experts with a strong focus on action: We enforce our very strict licence requirements and vigilantly monitor licensees to verify they are following the rules.

We do what it takes to keep Canada and Canadians safe!

LETTER TO THE MINISTER

The Honourable Joe Oliver Minister of Natural Resources Canada Ottawa, Ontario

Sir:

I have the honour of presenting to you the Annual Report of the Canadian Nuclear Safety Commission for the fiscal year ending March 31, 2012. The report has been prepared and is submitted in accordance with Section 72 of the *Nuclear Safety and Control Act*.

M. Binder

Michael Binder
President and Chief Executive Officer Canadian Nuclear Safety Commission

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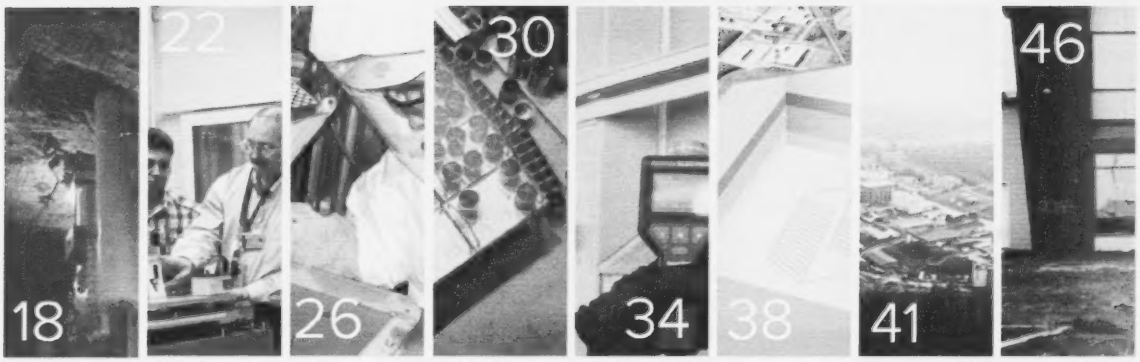

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MESSAGE FROM THE PRESIDENT

I am pleased to present the Canadian Nuclear Safety Commission (CNSC) Annual Report for 2011 to 12. This year's annual report focuses again on the CNSC's role as Canada's authority on nuclear safety. Time and again throughout the past year, our expert, knowledgeable and focused staff demonstrated their commitment to keeping Canada and Canadians safe.

In 2011, the international nuclear sector faced many challenges in the wake of TEPCO's Fukushima Daiichi nuclear power plant accident in Japan. It required the CNSC, other national nuclear regulators and nuclear power plant operators around the world to re-examine their operations and be able to assure the public of the industry's continued safety. During this time, the CNSC was Canada's source of reliable and timely information as events in Japan unfolded.

At the CNSC, we continue to focus on taking strong action and we remain steadfast in working with our international counterparts to ensure the safe and secure operation of major nuclear facilities at home and abroad. In addition to convening a Task Force to evaluate operational, technical, and regulatory implications of the Fukushima events, the CNSC engaged an External Advisory Committee of independent experts from outside the nuclear sector to assess its processes and responses to the accident. All of these recommendations have been integrated into a robust action plan, which will further enhance the safety of Canada's major nuclear facilities. The plan is available on the CNSC Web site.

In other initiatives, staff continued to support the Joint Review Panel (JRP) for the proposed Darlington New Nuclear Power Plant Project in the municipality of Clarington, Ontario. The CNSC has also been assisting a second JRP established to review Ontario Power Generation's proposed Deep Geologic Repository project to construct and operate a facility for the long-term management of low- and intermediate-level radioactive waste in Ontario.

Consultation with the public, licensees and interested organizations is an important part of the CNSC's commitment to transparency, as demonstrated by our focus on outreach, Web presence and Participant Funding Program (PFP) this year. CNSC employees have travelled across the country to participate in outreach activities with various targeted communities or to inform the public via "CNSC 101" sessions on our roles and responsibilities. Since its launch in 2011, the PFP has been opened six times and has awarded funding to 16 recipients to facilitate interventions at Commission hearings and inform the decision-making process. These are just some of the ways that the CNSC gathers feedback from interested parties.

Year after year, our accomplishments continue to showcase the CNSC as Canada's independent nuclear regulator with highly skilled, professional staff who are dedicated to our core commitment to Canadians: that we will never compromise safety.

With respect,
Michael Binder

M. Binder

CANADIAN NUCLEAR SAFETY COMMISSION OVERVIEW

VISION

To be the best nuclear regulator in the world

MISSION

To regulate nuclear activities to protect the health, safety and security of Canadians and the environment, and to implement Canada's international commitments on the peaceful use of nuclear energy

Caption: The CNSC's headquarters are in Ottawa and we have offices at each of Canada's five power reactor sites, a site office at Chalk River Laboratories and four regional offices across the country.

A LICENSING, REGULATORY AND OVERSIGHT ROLE

Under the *Nuclear Safety and Control Act* (NSCA), the CNSC licenses, regulates and establishes technical requirements for all nuclear-related activities in Canada. All those wishing to carry out nuclear-related activities – including activities related to the design of equipment, the construction, operation, decommissioning and abandonment of nuclear facilities, and the production, possession and use of nuclear substances – must first obtain a licence from the CNSC. We provide clarity on regulatory expectations and we oversee their activities to ensure they are following our requirements.

The Commission is the CNSC's decision-making body and makes licensing decisions for all major nuclear facilities in Canada.

Our staff participate in many national and international technical projects and meetings to improve the safety and security of nuclear facilities and activities here in Canada and around the world. These projects and meetings address areas ranging from new nuclear reactor designs, aging facilities and decommissioning practices to the effects of radiation on people and the environment, and nuclear non-proliferation activities.

The CNSC's Audit Committee, with three external and two internal members, reinforces the effectiveness of internal audits. It oversees key areas and processes such as values and ethics, risk management, management control and accountability reporting.

The CNSC's Evaluation Committee is also an essential component of the organization's governance structure. It serves as an advisory body to the President on the CNSC's evaluation plan, resourcing and final evaluation reports.

A MANDATE TO ENSURE SAFETY

The CNSC uses risk-informed regulatory approaches to plan and carry out licensing and compliance activities in order to establish appropriate regulatory requirements commensurate with the activities and the risk involved.

For facilities or activities where an accident could have severe consequences, the CNSC requires licensees to implement multiple layers of defence, in order to further minimize the likelihood of such an accident. That way, if a safety system or program fails, others are in place to keep the facility and workers safe and limit potential emissions. All major Canadian nuclear facilities are designed and operated with this "defence-in-depth" principle in mind.

The CNSC's strict oversight, which includes onsite inspections, ensures licensees are operating safely and adhering to their licence conditions.

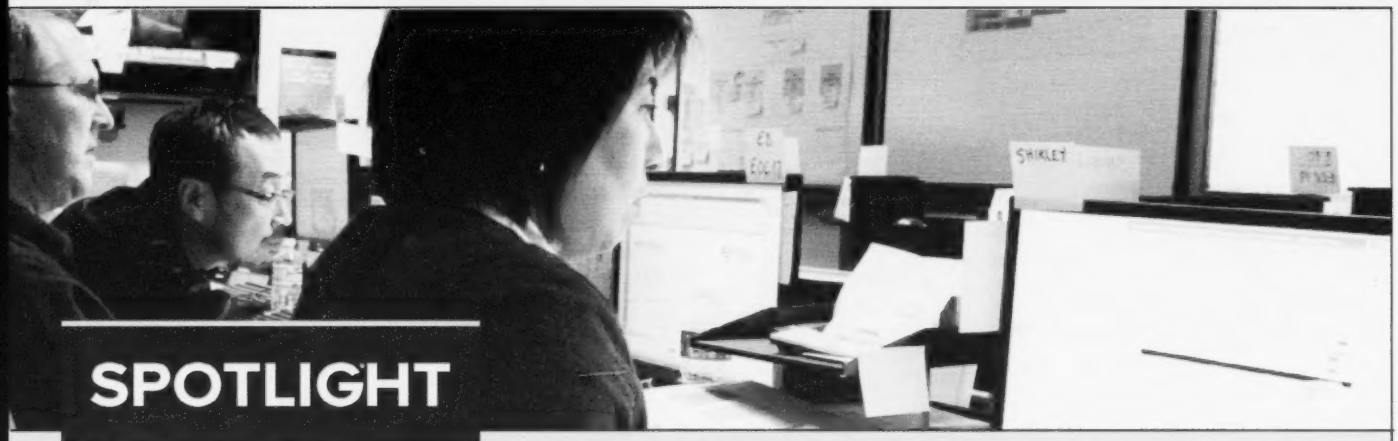
A FOCUS ON SAFETY AND PREPAREDNESS

The NSCA requires all licensees to demonstrate to the CNSC that their workers and management are fully trained to carry out their duties competently. We also require all nuclear, facilities to have comprehensive emergency programs. We work with nuclear operators, municipal, provincial and federal government agencies, first responders and international organizations so that we are ready to respond to a nuclear emergency at any time.

In the event of an emergency involving a nuclear facility or radioactive materials, the CNSC operates a full Emergency Operations Centre as part of the Government of Canada's response. The public and licensees can also call the CNSC Duty Officer, available 24 hours a day, to report actual or potential incidents. The Duty Officer will initiate prompt regulatory responses to ensure all appropriate measures are taken to protect people and the environment.

FOSTERING AN INTERNAL SAFETY CULTURE

The CNSC safety culture is derived from the organizational mission, programs and practices, along with employee and management actions and behaviours, which establish safety as an overriding priority. For the CNSC, this means embedding safety into everything we do and having the same focus on safety that we expect of our licensees.



SPOTLIGHT

Taking Pride in Our People

CNSC experts contribute their knowledge inside and outside of the workplace.

Photo Caption: CNSC staff hard at work at the Emergency Operations Centre, responding to the Fukushima Daiichi nuclear power plant accident in March 2011.

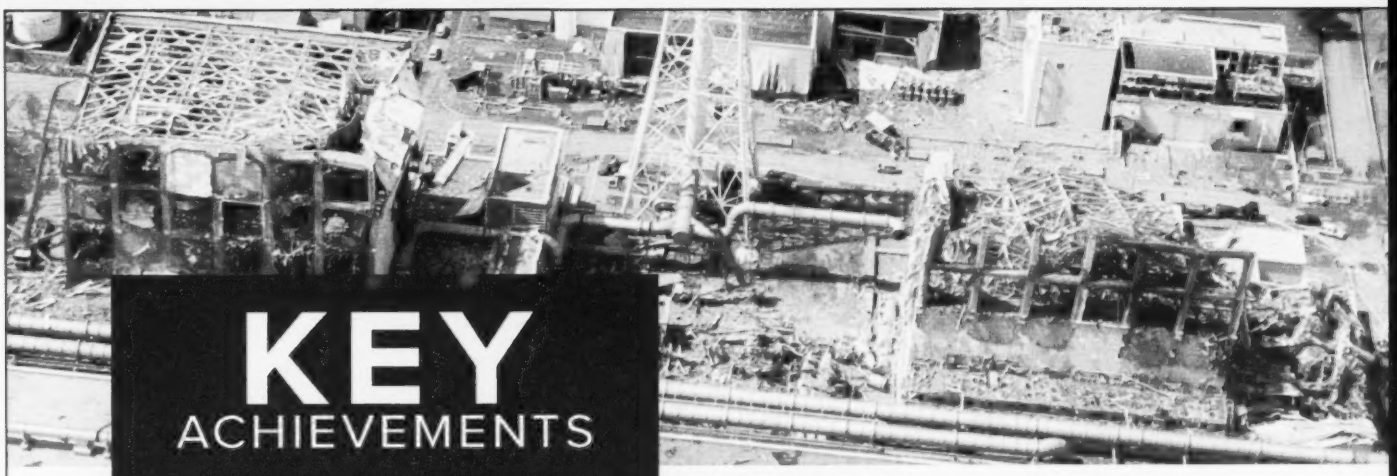
The CNSC takes pride in its employees, who demonstrate specialized expertise, dedication and professionalism every day. Roughly half of the CNSC's technical staff have doctorates or master's degrees in fields including nuclear engineering, chemistry, physics, environmental and radiation sciences, and epidemiology. Behind the scenes, these employees are hard at work undertaking technical assessments, analyzing data and establishing communication strategies to keep Canadians informed. CNSC staff were vital to the CNSC's response to TEPCO's Fukushima Daiichi nuclear accident in Japan – from supporting the Emergency Operations Centre to responding to international requests for assistance – and they continue to use their knowledge to ensure nuclear safety, both domestically and abroad.

The CNSC designates inspectors and makes sure they have the required skills, knowledge and training to do their jobs effectively. To be designated as an inspector requires completion of the CNSC's Inspector Training and Qualification Program.

CNSC employees are dedicated to promoting the organization's great work, here and abroad. Through career days, work fairs, and participation in domestic and international working groups, they take pride in their jobs and are the first to educate others the CNSC's role as Canada's nuclear regulator.

On top of that, most CNSC employees choose to take an active role in supporting their communities by volunteering for the Government of Canada Workplace Charitable Campaign (GCWCC). In 2011, the United Way Campaign Chair recognized the CNSC's success in exceeding its 2011 goal by a whopping 27 per cent – raising over $225,000. Consequently, the CNSC was a finalist for the GCWCC Michael Nurse Award, which recognizes organizations whose creativity and enthusiasm drove a successful campaign.

Photo Caption: CNSC GCWCC Campaign Executive Champion Terry Jamieson, and Campaign Chair Gerry Frappier volunteer at the Ottawa Mission for the "Seeing is Believing" event.



KEY ACHIEVEMENTS

OUR EXPERTS HARD AT WORK

Photo Caption: TEPCO's Fukushima Daiichi nuclear power plant accident in Japan.

Last year, CNSC staff demonstrated they could respond to unexpected matters swiftly, effectively and with transparency, as shown by their actions following TEPCO's Fukushima Daiichi nuclear accident in Japan.

Much effort in 2011 to 12 focused on ensuring that the lessons learned from that accident further strengthened the safety of Canadian nuclear facilities. Our activities related to Fukushima are addressed throughout this report, as they represent some of our most important achievements over the past year.

Our staff continued to let their expertise, leadership and knowledge shine through their work under our Core + Four framework, which outlines our way of doing business and represents the cornerstone of our commitment to being the best nuclear regulator in the world.

Launched in 2009, the Core + Four is an overall framework to guide our work. It consolidates the CNSC's priorities under five headings: core, commitment to ongoing improvements, clarity of our requirements, capacity for action and communication. The CNSC has made significant headway this year of these each priority area.

CORE WORK

Active licensing work

The Commission held 19 public meetings and hearings, in which 284 intervenors participated, and conducted 20 abridged hearings.

A joint review panel is an independent body that is appointed to review and assess a project in an impartial and objective manner. In the case of nuclear-related projects, a joint review panel will conduct the environmental assessment and consider the licence application to prepare a site for a proposed project; both processes run concurrently. However, a licence decision cannot be made before the environmental assessment has been completed, with a conclusion that there would be no significant adverse environmental impacts as a result of the project and allowing it to proceed. The CNSC President and the federal Minister of the Environment develop project-specific agreements to facilitate such joint reviews.

Under the Government of Canada's *Responsible Resource Development* plan – which aims to create jobs, economic growth and long-term prosperity for all Canadians by streamlining the review of major resource projects – joint review panels are no longer required for projects regulated by the CNSC.

In October 2009, a three-member joint review panel (JRP) was established for the proposed Darlington New Nuclear Power Plant Project located at the existing Darlington nuclear site in the municipality of Clarington, Ontario. In August 2011, the JRP submitted its environmental assessment (EA) report to the federal Minister of the Environment. The report follows a review of the environmental impact statement prepared by Ontario Power Generation (OPG) and a 17-day public hearing held in March and April 2011. In early 2012, the Government of Canada announced its response to the recommendations made in the report and determined that the project is not likely to cause significant adverse environmental effects.

In January 2012, a three-member JRP was created to review OPG's proposed Deep Geologic Repository project to construct and operate a facility for the long-term management of low- and intermediate-level radioactive waste in Ontario. As of June 2012, the environmental impact statement was under a six-month public review that had originally been scheduled for August 3, 2012. However, this time period was extended to accommodate the time required for OPG to respond to information requests from the panel.

Rigorous oversight

In 2011 to 12, the CNSC carried out close to 2,000 inspections relative to the 3,300 licences held by just over 2,500 licensees. As well, 738 export licences (186 of which were issued for risk-significant radioactive sources) and 91 import licences were issued pursuant to the *Nuclear Non-Proliferation Import and Export Control Regulations*. In terms of regulatory actions, we issued 15 orders (usually for a licensee to cease using a nuclear-related device until it has complied with CNSC orders) to specific licensees using nuclear substances, issued two requests or notices to licensees and decertified one exposure device operator (EDO).

Key safety-related positions at nuclear facilities and facilities that use nuclear-related equipment must be occupied by personnel who have been certified by the CNSC as qualified, trained and capable of performing their duties. In the fiscal year the CNSC issued 43 new certifications and 26 renewals for personnel at nuclear reactor facilities and certified 132 new exposure device operators for a total of 201 personnel certifications. On March 31, 2012, there were 577 personnel certified at Class 1 Nuclear facilities, and 5,903 Exposure Device Operators who have been certified by the CNSC.

Regulatory efficiencies

The CNSC collaborates with foreign nuclear regulators to exchange knowledge and cooperate on technical issues; for example, it participates in the Multinational Design Evaluation Program (MDEP), which helps nuclear regulatory organizations in different countries share their standards for reviewing new reactor power plant designs. During the past year, through the MDEP, the CNSC helped reach agreements with international counterparts on common regulatory positions in many key technical areas, such as digital instrumentation and control.

The CNSC provides the optional service of a pre-licensing vendor design review in assessing a vendor's design for a nuclear power plant or small reactor. The review process, divided into three consecutive phases, is intended to be undertaken by a reactor vendor before an applicant submits a licence application to the CNSC. For further information regarding vendor design reviews, please visit our Web site at **nuclearsafety.gc.ca**.

The following vendors are in various phases of design reviews:

- AECL, Advanced CANDU Reactor ACR-1000 design: Phase 3 completed in December 2012
- AECL, EC 6 (Enhanced CANDU 6) design: Phase 2 completed in April 2012
- Westinghouse, AP1000 design: Phase 1 completed, Phase 2 starting in summer 2012
- Generation mPower, mPower: Phase 1 will be completed in mid-2013
- ATMEA, ATMEA1 design: Phase 1 will be completed in mid-2013
- NuScale, NuScale design: Phase 1 application received and planning in progress
- AREVA, EPR design: Phase 1 currently on hold at the request of the vendor

Independent advice and expertise via our research program

The CNSC's research program provides staff with access to independent advice and expertise in support of its regulatory mission. The program also provides support to the development of national standards for safety, promotes international collaboration and knowledge sharing on best practices, and supports the dissemination of scientific information related to the CNSC's mandate.

Standards touch the lives of Canadians every day, affecting nearly every product or service they use, from the kettle in the kitchen to the lights overhead. Standards can range from safety and quality requirements to efficiency or environmental practices.

The Canadian Standards Association (CSA) is a membership association serving industry, government, consumers and other interested parties in Canada and the global marketplace. Many CSA energy standards are national standards in Canada and are cited in both federal and provincial regulations. In addition to providing energy standards, the CSA also helps to promote a safe and reliable nuclear power industry in Canada through the creation of specific nuclear industry standards.

In 2011 to 12, the CNSC continued to support the CSA's development of standards. For example, the public review phase was completed for the latest document in the CSA series related to environmental protection, *CSA N288.6 Environmental Risk Assessment at Class I Nuclear Facilities and Uranium Mines and Mills*. It is now undergoing final review.

In 2011 to 12, the research program spent a total of $2.2 million on regulatory research to support virtually all aspects of the CNSC's mission. Among other areas, this research focused on assuring the continued safety of the aging CANDU fleet, supporting recommendations made to the Darlington and Deep Geological Repository JRPs, understanding tritium's environmental and health effects, participating in the Counter-Terrorism Research and Technology Initiative with Health Canada and other partners, and for the first time — leading a project to detect illicit nuclear activity.

To ensure a continued supply of highly qualified people to support its mandate, the CNSC increased its support of the University Network of Excellence in Nuclear Engineering in its research and education mission. In the same vein, the CNSC worked in partnership with the National Science and Engineering Research Council, the Canadian Institutes of Health Research, and the Social Sciences and Humanities Research Council to establish a merit scholarship at the doctoral level to promote research in nuclear safety and security.

Meaningful public and Aboriginal participation

Since its launch in February 2011, the CNSC's Participant Funding Program has been opened six times, with $194,029 awarded to 16 recipients to provide additional information to the Commission related to five re-licensing hearings and one ongoing EA. Successful applicants — Aboriginal groups, community groups and everyday citizens — all received funding in support of their interventions in regulatory matters related to nuclear facilities. Feedback from a recipient survey showed that the CNSC is on track with a program that was largely well-received and appreciated. For more information on the program, please see the spotlight on p. 48.

Also in 2011, the CNSC posted *Supplementary Information for Licensees: Aboriginal Consultation* on its Web site. This document offers advice to applicants and licensees on how to prepare for consultation with Aboriginal groups, in relation to a new licence application or an application to review an existing licence. It also encourages licensees to build relationships with Aboriginal groups, suggests that Aboriginal consultations take place throughout the life of a project and advises that such information may be used by the CNSC in its decision-making process.

THE PRIORITIES: OUR 4 Cs

Photo Caption: Areva's McClean Lake uranium mine in the Athabasca Basin, Saskatchewan.

1 COMMITMENT TO ONGOING IMPROVEMENTS

The IAEA returned in 2011 to complete its follow-up assessment of Canada's nuclear regulatory framework. It determined that significant progress has been made against the recommendations and suggestions of the 2009 Integrated Regulatory Review Service (IRRS) mission report.

"The CNSC should be commended for the significant progress made in addressing the findings identified in the 2009 IRRS mission and for inviting this follow-up review."
— IRRS Team Leader Martin Virgilio, Deputy Executive Director for Reactor and Preparedness Programs, United States Nuclear Regulatory Commission

Opportunities identified through assessments such as the IRRS mission, audits, evaluations, and lessons learned are managed under a single corporate improvement plan. This plan integrates, aligns and prioritizes all CNSC improvement initiatives that under different organizational functions.

2 CLARITY OF REGULATORY REQUIREMENTS

The CNSC's regulatory framework consists of laws passed by Parliament that govern Canada's nuclear industry. It also includes regulations, licences and documents that the CNSC uses to oversee the nuclear activities and facilities in Canada. These documents fall into two broad categories: those that set out **requirements**, and those that provide **guidance** on requirements. The CNSC is committed to clarifying its regulatory requirements, and discussion papers are one of the ways it achieves this.

In 2011 to 12, the CNSC published its five-year Regulatory Framework Plan, which sets out the regulations and other regulatory framework documents that it intends to develop or amend in the coming years. Also, a number of new and/or amended regulatory documents were finalized during the year, in order to clarify regulatory requirements. For a complete list and short description of the projects completed this year, refer to Annex B on p. 80. The CNSC considers published regulatory and guidance documents to be living documents and welcomes feedback on them at any time. Both the Regulatory Framework Plan and a complete list of regulatory documents are available at **nuclearsafety.gc.ca**

Discussion papers play an important role in the selection and development of CNSC requirements or guidance. They are used to solicit early public feedback on CNSC policies or approaches. The use of discussion papers early in the regulatory process underlines the CNSC's commitment to a transparent consultation process.

In 2011 to 12, the following discussion papers were released for public consultation:

- *Protection of Groundwater at Nuclear Facilities in Canada* (DIS-12-01)
- *Process for Establishing Release Limits and Action Levels at Nuclear Facilities* (DIS-12-02)
- *Fitness for Duty: Proposals for Strengthening Alcohol and Drug Policy, Programs and Testing* (DIS-12-03)

3 CAPACITY FOR ACTION

In 2012, the CNSC was once again named one of the National Capital Region's Top 25 Employers. We are proud of this achievement and continue to implement programs and activities to retain our highly talented workforce.

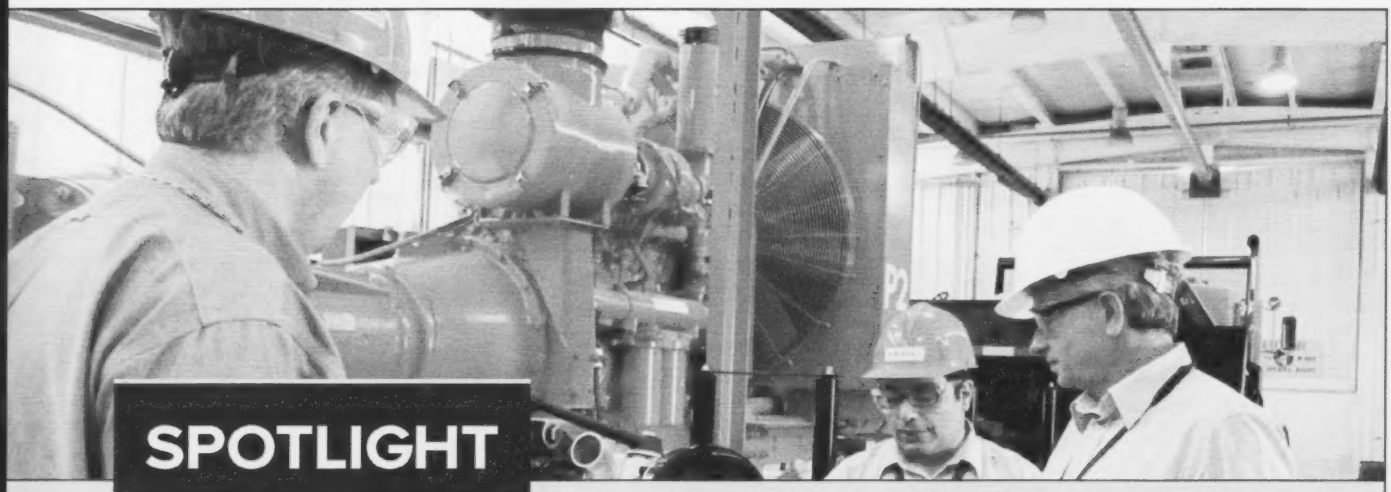
The CNSC also held workshops throughout Canada on the *Implementation of Financial Guarantees for Licensees* (DIS-11-01) discussion paper which was issued in March 2011. At these sessions, input was gathered from more than 1,000 stakeholders across Canada on the proposed program for putting financial guarantees in place for users of nuclear substances, prescribed equipment and Class II nuclear facility operators. In addition, two webinars were held for those who could not attend the workshops.

4 COMMUNICATIONS

Social media played a major role in informing the public of the tragic events that unfolded at the Fukushima Daiichi nuclear power plant in Japan, in March 2011. Given the importance of social media in public communications, the CNSC has been accelerating its adoption of social media tools to reinforce its online presence and to ensure timely access to safety information before or during a crisis. In February 2012, the CNSC launched its English and French Facebook pages, and it will continue to expand its use of social media tools, including YouTube.

Over the past year, the CNSC held many "CNSC 101" sessions, in which representatives visited Canadian communities and held informative seminars where they explained the CNSC's role and structure. They also answered questions on how the CNSC safely regulates Canada's nuclear industry. Five sessions were held this year across the country in Saint John, New Brunswick; Mississauga, Ontario; Yellowknife, Northwest Territories; Montreal, Quebec; and Calgary, Alberta. Feedback from the sessions has been positive to date. To view the schedule of upcoming CNSC 101 sessions and presentation materials, visit **nuclearsafety.gc.ca**

The CNSC requires licensees and licence applicants to develop and implement public information programs that include a disclosure protocol, in order to establish an atmosphere of openness, transparency and trust with respect to their operations. To improve the public's level of understanding on information about proposed or licensed nuclear facilities and activities, as well as their potential impact on local communities, a new regulatory guidance document, *Public Information and Disclosure* (RD/GD-99.3), was developed and published.



SPOTLIGHT

Revisiting Fukushima, One Year Later

Photo Caption: Greg Rzentkowski (in white helmet), Director General of Power Reactor Regulation, takes a first-hand look at the emergency portable pumps purchased by Ontario Power Generation for its Darlington Nuclear Generating Station near Bowmanville, Ontario (May 2012). The new emergency equipment will further strengthen the operator's emergency preparedness.

The CNSC continues to focus on action and remains steadfast in working with its international counterparts to ensure the safe and secure operation of nuclear power plants at home and abroad.

Following the March 2011 accident at TEPCO's Fukushima Daiichi nuclear power plant (NPP), the CNSC immediately activated its Emergency Operations Centre to monitor the situation and to provide advice to the Government of Canada.

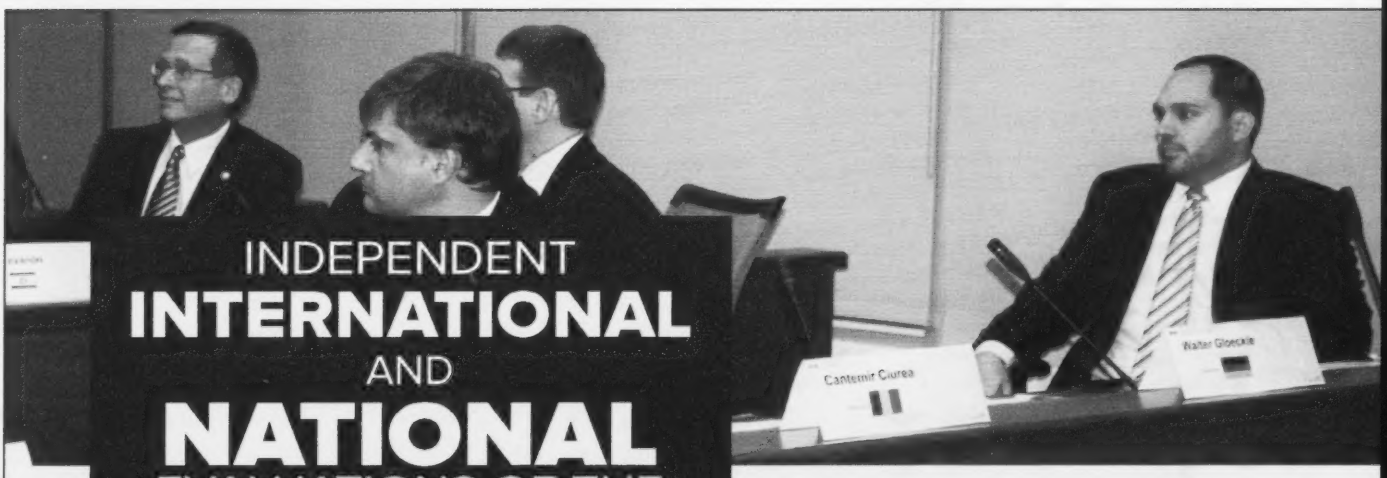
Shortly after that, the CNSC requested licensees of Canadian NPPs, research reactors and fuel fabrication facilities to review the lessons learned from the Fukushima Daiichi incident. The CNSC also inspected all NPPs and other nuclear facilities in Canada to assess the readiness of their mitigating systems, and launched a review of all major nuclear facilities in Canada.

The review, led by the CNSC Fukushima Task Force, confirmed that Canadian NPPs are robust and have a strong design that relies on multiple layers of defence. The design ensures there would be no impact on the public from external events regarded as credible, and it also offers protection against more severe external events that are much less likely to occur.

Nevertheless, the Task Force had several recommendations for strengthening each layer of defence built into the Canadian NPP design and licensing philosophy. These recommendations formed the basis for a solid action plan to further minimize risks at Canada's NPPs, and included measures to improve emergency preparedness and the Canadian nuclear regulatory framework. Full details of the plan can be found in the *CNSC Fukushima Task Force Report* (INFO-0824), which was posted on the CNSC's Web site in October 2011.

Both the Task Force Report and the action plan that was subsequently put in place went through several rounds of public consultation, as well as, two independent evaluations, which confirmed that the CNSC's response to the events in Fukushima was prompt, appropriate and comprehensive.

Internationally, CNSC staff have been taking a leadership role among their peers. In addition to participating in fora to share lessons learned, they have supported open dialogue and greater transparency within the international nuclear community.



INDEPENDENT INTERNATIONAL AND NATIONAL EVALUATIONS OF THE CNSC'S RESPONSE

Photo Caption: Integrated Regulatory Review Service meeting in Ottawa November 2011.

The CNSC was the first national nuclear regulator to request a review of its response to TEPCO's Fukushima Daiichi accident by the International Atomic Energy Agency (IAEA). An Integrated Regulatory Review Service (IRRS) mission, which is an IAEA-sponsored peer review was conducted by nuclear regulatory experts from other member states.

The IRRS mission concluded that the CNSC's actions in response to the accident were prompt, robust and comprehensive, and identified them as good practice that should be used by other regulatory bodies. The international experts made two recommendations and one suggestion, which were all addressed in the CNSC's action plan in response to the events in Fukushima.

SECOND EXTRAORDINARY MEETING OF THE *CONVENTION ON NUCLEAR SAFETY*

This special meeting is planned to be held in August 2012 in Vienna, Austria. It seeks to find new ways for the international community to enhance nuclear safety through the review and exchange of lessons learned and actions taken in response to the Fukushima nuclear power plant accident.

Did you know? Canada was one of the first signatories of the *Convention on Nuclear Safety*, which was established to promote a high level of safety at nuclear power plants around the world. Canada is also one of the staunchest promoters and supporters of the Convention's objectives.

Furthermore, the CNSC President established an External Advisory Committee in August 2011 to assess the CNSC's processes and responses to the accident. The committee, made up of independent experts in energy, scientific innovation, engineering, governance and safety from outside of the nuclear sector, published its report in April 2012. It concluded the CNSC had responded promptly and appropriately, and also identified nine recommendations that complemented those of the CNSC Task Force. The recommendations were integrated with the CNSC's action plan.

For additional information about the Fukushima Daiichi nuclear accident and the CNSC's response, including the *Report of the External Advisory Committee*, visit the "CNSC Information Related to Japan Earthquake" page in the Media Centre at **nuclearsafety.gc.ca**

TIMELINE OF EVENTS AND ACTIONS TAKEN

DATE	EVENT
11 Mar 2011	A magnitude 9.0 earthquake near Japan generates an estimated 15-metre tsunami at the **Fukushima Daiichi nuclear power plant**
11 Mar 2011	CNSC activates **Emergency Operations Centre**
19 Apr 2011	CNSC creates multidisciplinary expert **Task Force**
7 July 2011	CNSC issues Safety Review Criteria – **Canada's "stress test"** for nuclear power plants
5 Aug 2011	CNSC's President forms **External Advisory Committee**
28 Oct 2011	Public consultation on **Task Force Report** and **Management Response**
21 Dec 2011	First public consultation on draft **Action Plan** on Task Force recommendations
2 Mar 2012	**Second public consultation** on draft Action Plan
5 Mar 2012	**CNSC first nuclear regulator to receive IAEA evaluation** of its response to the Japan nuclear accident
12 Apr 2012	**External Advisory Committee delivers report** to CNSC President Michael Binder
3 May 2012	The Commission holds **public meeting** to discuss the results of public consultations and the way forward on Action Plan
MOVING FORWARD...	
Aug 2012	Extraordinary Meeting of Convention on Nuclear Safety on Fukushima accident – culmination of extensive international peer-review exercise
Dec 2012	Deadline for short-term actions to be completed
April 2013	International Conference on Effective Nuclear Regulatory Systems in Ottawa, Canada
Dec 2013	Deadline for medium-term actions to be completed
Dec 2015	Deadline for long-term actions to be completed

SAFE ENVIRONMENT

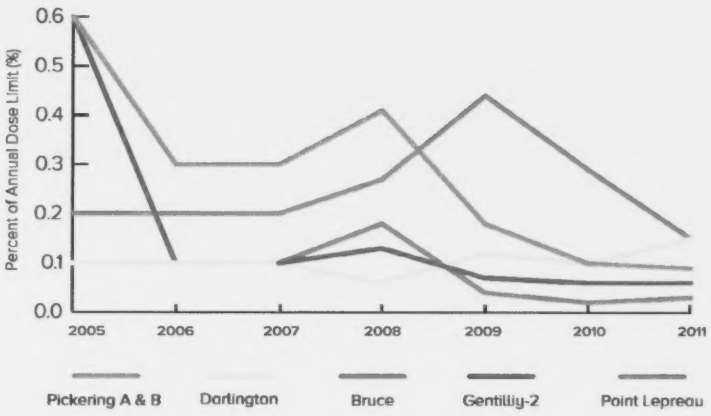
PROTECTING THE ENVIRONMENT TODAY AND FOR FUTURE GENERATIONS

Photo Caption: CNSC inspector takes water samples.

SAFETY SUMMED UP

- Radiation doses to the public living around nuclear facilities remain far below regulatory dose limits (see figure 1).

Figure 1: Public doses around Canadian nuclear power plants as a percentage of annual public dose limit of 1 millisievert (mSv)



From 2005 to 2011, radiation doses to members of the public living near Canadian nuclear power plants were under one percent of the regulatory dose limit.

Note: The scale in the above figure represents only 1% of the annual public dose limit of 1 mSv.

Every year, the CNSC takes part in a wide range of environmental activities, including environmental assessments (EAs), which evaluate the risks and potential environmental footprint of proposed nuclear projects and how to minimize them. We also stringently monitor and evaluate our licensees against strict criteria to make sure they comply with environmental regulations and requirements. Last year, we completed 3 out of 22 active EAs, in order to understand how proposed nuclear-related projects could affect the environment and that any risks would be mitigated if the projects were to proceed.

The CNSC has established strict limits on the levels of radiation that the public can be exposed to, and on releases to the environment where nuclear substances are stored or where nuclear activities take place.

The CNSC works hard to make sure that nuclear activities in Canada will not harm people or the environment.

Quick facts on environmental assessments:

- **An EA is used as a planning tool and is conducted before a project is allowed to proceed. It helps predict, evaluate, and manage the environmental effects of a proposed project.**
- **In accordance with the *Canadian Environmental Assessment Act* and its regulations, the CNSC oversees EAs to make sure nuclear projects are safe for the environment.**
- **The CNSC's EA process is slightly different from EA processes at other federal departments and agencies because the Commission makes most EA decisions.**
- **An EA provides opportunities for public and Aboriginal participation at several stages.**

PROVIDING CANADIANS WITH INFORMATION

In September 2011, the CNSC held a public open house in Port Hope, Ontario, to inform the public on the process for the EA for the redevelopment of the Port Hope Conversion Facility (Vision 2010). The proposed Vision 2010 project includes the cleanup of contaminated soil, building materials and stored wastes from historic operations at the facility. An EA is being conducted to identify possible environmental effects, to propose measures to mitigate adverse effects, and to determine if there would be significant environmental effects even after the mitigation measures are implemented. The CNSC open house included detailed posters about the proposed project, a CNSC staff presentation on the EA process, and opportunities for the public to speak with CNSC experts.

The CNSC also developed a set of Web pages about radiation, with the goal of providing the public with clear information about its mandate in an easy-to-understand format. The "Introduction to Radiation" pages (found in the Reading Room on the CNSC Web site) include definitions, an overview of the types and sources of radiation, potential health effects of radiation, and CNSC regulatory controls to protect the health and safety of workers and the public.

TAKING SWIFT ACTION

The CNSC licenses dosimetry services, which monitor worker radiation doses on behalf of licensees In order to ensure that workers do not receive doses that exceed regulatory limits. In 2011, the CNSC discovered that doses to more than 1,700 workers had been underestimated by one dosimetry service provider. The CNSC reacted immediately to ensure that the doses were recalculated correctly, that the workers were notified of the corrections, that dose records were corrected in Health Canada's National Dose Registry, and that the errors committed by the dosimetry service would not be repeated.

IMPROVING THE CNSC LABORATORY

The CNSC continued to upgrade its laboratory infrastructure by acquiring new equipment and instruments for calibration and analytical services, in areas such as radiation protection, environmental protection, safeguards and emergency preparedness, which help support the CNSC's compliance programs.

The CNSC's newly acquired G-10 gamma irradiator represents one of the most significant recent additions to the laboratory. This state-of-the-art technology ensures accurate calibration of radiation detectors used by CNSC inspectors, to ensure the detectors are providing correct radiation readings.

SPOTLIGHT

Worker Protection Is a Top Priority

The CNSC and nuclear power plant operators are moving forward with more rigorous radiation protection programs after implementing significant changes to the way alpha radiation is monitored onsite.

In November 2009, a routine survey during refurbishment operations at the Bruce A Nuclear Generating Station detected the presence of radioactive alpha contamination in the Unit 1 reactor vault.

During the subsequent investigation, it was determined that certain workers had been exposed to the alpha contaminants, both from the event and as a result of historical work activities. (Detailed worker dose information for 2009 is shown in figure 2.)

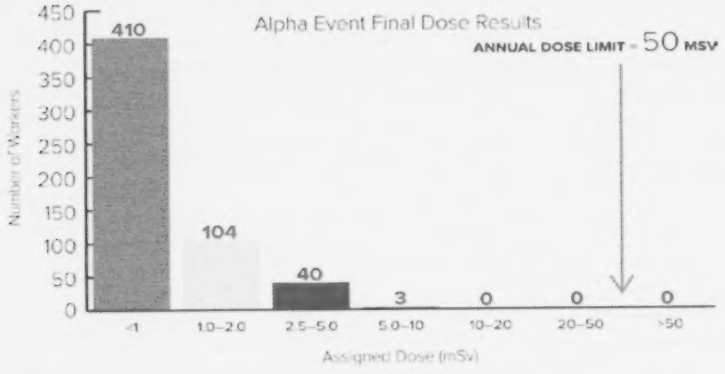
Given that worker safety is a top priority, the CNSC ordered all nuclear power plant operators in Canada to take immediate action to assess alpha hazards in their facilities and to improve their radiation protection programs related to alpha monitoring and control. A careful assessment of the individual doses for the 557 workers involved in the Bruce event indicated that no dose exceeded regulatory limits. No adverse health effects are expected for any of those involved.

A careful assessment of the individual doses for the 557 workers involved in the Bruce event indicated that no dose exceeded regulatory limits. **No adverse health effects are expected for any of those involved.**

Learning from these events, the CNSC and Canada's plant operators have moved forward with enhanced regulatory oversight and radiation protection practices.

The CNSC has required each operator to develop a long-term action plan to prevent a similar event. The action plans cover 17 areas, including workplace surveillance, work planning, dosimetry, signage, personal protective equipment and training. To date, the operators have made significant progress in implementing their action plans and the CNSC is monitoring their progress closely through regular inspections and reviews.

Figure 2: Final dose results for workers at the Bruce A Unit 1 in 2009



Of the 557 affected workers: 410 workers received doses of less than 1.0 mSv, 104 workers received doses from 1.0 to 2.0 mSv, 40 workers received dose between 2.0 and 5.0 mSv, 3 workers received doses between 5.0 and 10 mSv, and 0 workers received doses greater than 10 mSv. No worker received a dose greater than the regulatory limit of 50 mSv.

The lessons learned from the incident have led to strengthened regulatory oversight and radiation protection requirements for all nuclear power plants in Canada.

SAFE URANIUM MINES AND MILLS

A NATURAL RESOURCE AS NUCLEAR FUEL

With the help of regional offices and full-time staff, the CNSC ensures that the health of workers, local residents and the surrounding environment at uranium mine and mill sites are protected.

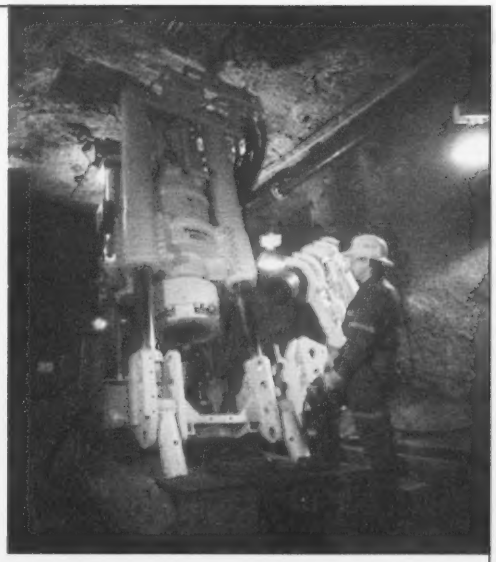


Photo Caption: Cameco's McArthur River uranium mine in the Athabasca Basin, Saskatchewan.

SAFETY SUMMED UP

- CNSC inspectors worked closely with provincial inspectors from the Saskatchewan ministries of labour and the environment to monitor licensees' occupational health and safety programs, including those for radiation protection. Personal dose records for operating mines and mills from 2006 to 2011 showed that radiation doses to workers were safe and well below regulatory limits.
- During the reporting period, the number of reportable events remained stable at Canada's uranium mines and mills (23 in 2009, 20 in 2010 and 21 in 2011). Licensees are required to notify the CNSC of events or situations CNSC follows up to ensure the licensee has a plan in place to prevent such events from reoccurring.
- In 2011 to 12, effluent discharges to the environment from uranium mining did not exceed regulatory limits.

Canada is the world's second largest uranium producer, accounting for 18 percent of global production. Ninety percent of Canada's production is exported. Raw ore from uranium mines is processed at a milling facility to extract uranium, and the uranium concentrate is then processed further to create fuel for nuclear power reactors.

The CNSC regulates and licenses all uranium mines and mills in Canada. Thanks to the country's longstanding experience in uranium mining, the health and safety of Canadians and their environment are well protected by stringent regulations and world-leading practices. These licensing requirements and practices have evolved over time to reflect changes in scientific knowledge as well as the public's expectations.

The CNSC conducts multiple inspections every year at all uranium mines and mills. These inspections ensure that radiation levels are kept well below regulatory limits, protect workers and the public from other potential hazards, and verify that all activities are environmentally responsible and safe. Handling and transport of uranium in Canada are also regulated by the CNSC.

This year, in its oversight role, the CNSC conducted inspections at all operating Canadian uranium mines and mills: Key Lake, Rabbit Lake and McArthur River, all located in Northern Saskatchewan. In addition, the McClean Lake Operation (in maintenance and care mode) and Cigar Lake (which is under construction) were inspected.

The CNSC also continued to review applications from three mining companies that have expressed interest in establishing new uranium projects: Strateco Resources for the Matoush Underground Exploration project (Quebec), AREVA Resources Canada for its Midwest (Saskatchewan) and Kiggavik (Nunavut) mining projects, and Cameco Corporation for the Millennium mine project (Saskatchewan).

HEALTH AND SAFETY OF URANIUM MINING INDUSTRY

Occupational health and safety is an important indicator of the uranium mining industry's performance. Inter-industry comparison statistics for lost-time incidents[1] over the past five years show uranium mining to be among the safest industrial occupations for workers in Saskatchewan (see Table 1 for more information).

Table 1: Inter-industry comparison of lost-time incidents in Saskatchewan from 2007 to 2011

	% OF WORKERS INJURED WITH TIME LOSS				
Industry description	**2007**	**2008**	**2009**	**2010**	**2011**
Open-pit* mining (includes McClean Lake)	1.08	0.93	0.50	0.69	0.78
Underground soft rock mining	1.39	2.05	1.62	1.27	1.29
Underground hard rock mining	2.79	2.38	1.36	1.17	1.48
Construction trades	7.19	6.46	5.75	4.60	2.24
Automotive service shop towing	3.72	3.31	2.91	2.36	1.92
Operation of oil wells	1.21	0.73	0.97	0.76	0.75
Servicing of oil wells	3.74	3.78	2.98	3.82	1.87
Forestry operations	4.27	5.23	5.11	4.40	n/a
Refineries/upgraders	0.78	1.46	1.31	1.37	0.84
Machine shops	11.15	9.59	7.28	6.37	2.33
Government of Saskatchewan and ministries	3.02	3.05	3.23	3.13	1.39

Source: Saskatchewan Workers' Compensation Board Statistical Supplement

* Uranium mines in Saskatchewan are classified as underground hard rock mines, although McClean Lake is an open pit mine.

1 When a worker becomes injured and loses time from work. Provincial workers' compensation boards compile LTI statistics for major industries as a conventional health and safety measure.

SPOTLIGHT

Storing Mill Tailings and Waste Rock Safely

Photo Caption: Gunnar tailings reclamation.

Mining operators are required to manage the radioactive waste from Canada's uranium mines and mills with care and in accordance with strict regulations.

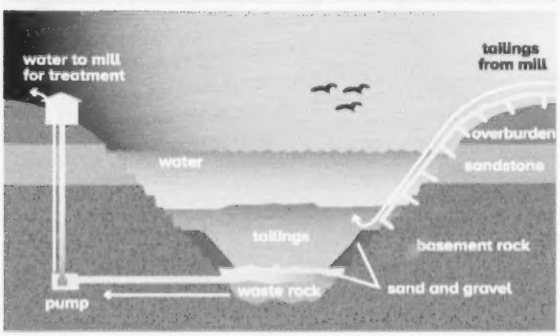
The CNSC regulates and licenses all aspects of uranium mines and mills in Canada, and makes sure that uranium-mining companies take every precaution to achieve the highest levels of safety for workers, the general public and the environment. Licensees are required to comply with the many safety standards governing the management of waste rock and mill tailings.

Careful treatment of tailings, waste rock and clean rock

As part of their licence conditions, uranium-mining operators must manage mining and milling waste safely and securely; these conditions include making arrangements for long-term waste management to protect the health and the environment, both now and in the future. In the past year, the CNSC's current requirements were documented in the regulatory document *Management of Uranium Mine Waste Rock and Mill Tailings* (RD/GD-370) (see Annex B on p. 80 for more information).

Tailings from the uranium milling process are isolated, stored and monitored in tailings management facilities – such as tailing ponds or mined-out open pits – that are rigorously engineered for safe, long-term storage and stability (see Figure 3). These facilities ensure that groundwater and surface water are diverted (so that clean water does not become contaminated), using features such as man-made barriers to prevent contact between tailings and groundwater.

Figure 3: A typical design for in-pit tailings management



Waste rock is usually stored temporarily on the earth's surface in piles, which have collection systems for treating any water that runs off or filters through the pile. After mining, waste rock can be used as backfill in underground mines or placed in a mined-out pit. A modern practice is to develop a management strategy for waste rock that prevents it from posing a threat to the environment in the long term.

Clean rock that remains after mining is left in piles, and then contoured and re-vegetated. This rock can also be used in construction, as aggregate for concrete or for building roads, among other applications.

SAFE NUCLEAR PROCESSING AND RESEARCH

AN IMPORTANT PART OF CANADA'S NUCLEAR SECTOR

Uranium processing plants and research facilities that use nuclear energy are carefully regulated and licensed by the CNSC to protect Canadians and the environment.

Photo Caption: A CNSC inspector at Canadian Light Source Inc, Canada's national synchrotron research facility.

SAFETY SUMMED UP

- In 2011 to 12, there were no events with consequences to public health or the environment.
- The annual safe radiation dose limit for members of the public is 1 millisievert (mSv). Radiation doses to the public continued to be well below regulatory limits (see figure 4).

Table 4: Public radiation doses as a percentage of regulatory limits for four major Canadian nuclear processing and research facilities

	2005	2006	2007	2008	2009	2010	2011
Chalk River Laboratories (AECL)	9.8	10.3	8.6	10.6	4.1	3.2	7.4
Cameco Port Hope Uranium Conversion Facilities	2.3	2.8	6.4	1.4	3.4	1.9	1.9
Cameco Blind River Uranium Refinery	1.2	1.2	2.4	3.6	0.1	0.6	0.6
Cameco Fuel Manufacturing Inc.	11.6	1.0	0.4	0.7	0.2	0.2	4.2

Radiation doses to members of the public, from Canadian nuclear processing and research facilities, were well below the regulatory limit of 1 mSv per year between 2005 and 2011.

Note: The scale in the above table represents only 20% of the 1 mSv annual public dose limit.

In 2011 to 12, the CNSC continued overseeing nuclear processing and research facilities to protect people who live and work near these facilities, and to protect the surrounding environment. From uranium processing facilities to research reactors and accelerators, nuclear-related processing and research plays an important role for many Canadians. For example, research reactors and accelerators are used in scientific research, training, materials testing and to produce radioisotopes for medical procedures.

In addition to the Chalk River Laboratories licence renewal (see spotlight on p. 25 for more information), the CNSC also held two-day public hearings on licence renewal applications from Cameco's three fuel cycle facilities in Ontario: the Blind River Refinery, the Port Hope Conversion Facility and Cameco Fuel Manufacturing Inc. The CNSC held hearings in the community of Port Hope to accommodate interventions from members of the community.

The CNSC recognizes that most Canadian nuclear processing and research facilities emit small or negligible effluents to the environment, and takes a risk-informed approach to the licensing and inspection of these facilities.

The CNSC also imposed strict restrictions on Shield Source Inc. in Peterborough, Ontario, after it was discovered that its operations had exceeded the licence limit for tritium gas discharges. Processing operations will remain shutdown until the CNSC is satisfied the licensee has understood the causes and made changes to its operations, to prevent similar events from happening again.

SPOTLIGHT

Enabling Canada's Continued Nuclear Research Capabilities

A look at an innovative, comprehensive licence renewal.

Photo Caption: National Research Universal (NRU) reactor at the Atomic Energy of Canada Limited, Chalk River Ontario.

In 2011, following a two-day public hearing, the CNSC announced its decision to renew the operating licence of Atomic Energy of Canada Limited's Chalk River Laboratories (CRL) until October 31, 2016.

The Commission made its decision to renew the licence based on submissions from Atomic Energy of Canada Ltd. (AECL) and 14 intervenors, as well as recommendations from CNSC staff. CNSC staff spent more than 30,000 hours between 2008 and 2011 assessing more than 10,000 pages of AECL's supporting information.

Within the broader context of the CRL licence renewal, AECL undertook an integrated safety review (ISR) of the National Research Universal (NRU) reactor. The review is the first of its kind to be applied to a research reactor (in the past, ISRs were undertaken only for nuclear power plants) and gives greater assurance than ever that the NRU reactor is safe to operate. The review also incorporated lessons learned from the Fukushima Daiichi accident.

The ISR involved a comprehensive, systematic evaluation of the NRU's design, condition and operating programs and resulted in an Integrated Improvement Plan which details how the reactor must be improved both physically and operationally between now and 2021. The review also aimed to determine the extent to which the NRU conforms to modern standards, and identified improvements required to justify the reactor's continued safe operation for the next 10 years.

HELPING CANADIANS PARTICIPATE

Participant funding was made available to Canadians for the first time to help interested parties review and comment on AECL's licence application (for more information on the Participant Funding Program, see p. 48). Three funding applicants received financial assistance so they could fully participate in the regulatory decision-making process.

A complete record of proceedings and decision, as well as hearing transcripts, are available on the CNSC Web site at **nuclearsafety.gc.ca**, or upon request from the CNSC.

SAFE **NUCLEAR** POWER

SAFE OPERATION OF NUCLEAR REACTORS IN CANADA

The CNSC regulates all nuclear power plants (NPPs) in Canada. It carefully evaluates licence applications against strict criteria and only issues licences to those that are qualified. The CNSC also ensures licensees comply with requirements through verification, enforcement and mandatory reporting measures.

SAFETY SUMMED UP

Based on inspections and reviews conducted during the year, CNSC staff concluded that Canada's NPPs operated safely during 2011. This conclusion is based on the following observations:

- There were no serious process failures at any NPP.
- No member of the public received a radiation dose that exceeded the regulatory limits.
- No plant worker received a radiation dose that exceeded the regulatory limits.
- The frequency and severity of injuries/accidents involving workers were minimal.
- No members of the public received a radiation dose that exceeded the regulatory limits.
- No radiological releases from the stations exceeded regulatory limits.
- All NPPs received either a satisfactory or fully satisfactory integrated plant rating.

SAFETY PERFORMANCE ASSESSMENT

The CNSC publishes a yearly report on the safety performance of NPPs. The report includes ratings for each of the 14 safety and control areas used at the CNSC to determine a station's overall performance, or integrated plant rating (IPR). The SCA ratings were either satisfactory or fully satisfactory for all safety and control areas at every station. The 2011 ratings, along with industry averages, are presented in table 2.

The rating categories are "fully satisfactory" (FS), "satisfactory" (SA), "below expectations" (BE) and "unacceptable" (UA). As can be seen, the IPRs were either satisfactory or fully satisfactory for all stations.

Table 2: Safety performance ratings for Canadian nuclear power plants for 2011

Safety and control area	Bruce		Darlington	Pickering		Gentilly-2	Point Lepreau	Industry Average
	A	B		A	B			
Management system	SA	SA	SA	SA	SA	SA	SA	SA
Human performance management	SA	SA	SA	SA	SA	SA	SA	SA
Operating performance	SA	SA	FS	SA	SA	SA	SA	SA
Safety analysis	SA	SA	SA	SA	SA	SA	SA	SA
Physical design	SA	SA	SA	SA	SA	SA	SA	SA
Fitness for service	SA	SA	FS	SA	SA	SA	SA	SA
Radiation protection	SA	SA	FS	SA	SA	SA	SA	SA
Conventional health and safety	FS	FS	FS	SA	SA	SA	SA	SA
Environmental protection	SA	SA	SA	SA	SA	SA	SA	SA
Emergency management and fire protection	SA	SA	SA	SA	SA	SA	SA	SA
Waste management	SA	SA	SA	SA	SA	SA	SA	SA
Security	FS	FS	SA	SA	SA	SA	SA	SA
Safeguards	SA	SA	SA	SA	SA	SA	SA	SA
Packaging and transport	SA	SA	SA	SA	SA	SA	SA	SA
Integrated plant rating	SA	SA	FS	SA	SA	SA	SA	SA

REGULATORY MILESTONES AND HIGHLIGHTS

Pickering: final years of operation

The operating licences for Pickering A and B will expire in June 2013. In preparation for licence renewal, OPG has submitted a consolidated operating licence application for the two plants, which includes the continued operation plan. The CNSC requested this plan since OPG intends to shut down all units at Pickering A and Pickering B by the end of 2020.

Gentilly-2: licence renewed

The operating licence for Gentilly-2 was renewed this year and is now valid until June 30, 2016. If the station is not eventually refurbished, it will cease to operate and be placed in shutdown mode. The new licence combines power reactor operations and waste management for the first time.

Darlington: examining proposed refurbishment activities

The operating licence for Darlington will expire in February 2013. OPG has submitted a licence renewal application for Darlington, which is being reviewed by the CNSC staff. The Commission hearing for the licence renewal is planned for November 2012.

The facility's refurbishment and continued operation project is in the planning stages. OPG has submitted the integrated safety review documents, an environmental impact statement and other technical information in support of the project's EA. CNSC staff and other federal authorities are reviewing these documents. The Commission hearing for the EA for refurbishment is also planned for November 2012, as is the hearing for the renewal and expansion of the waste management facility.

Point Lepreau: new licence covering restart activities

The Commission renewed the operating licence for Point Lepreau for the period between February 2012 and June 2017. The refurbishment project for the plant progressed well in the last year. The CNSC authorized New Brunswick Power Nuclear to reload fuel in March 2012.

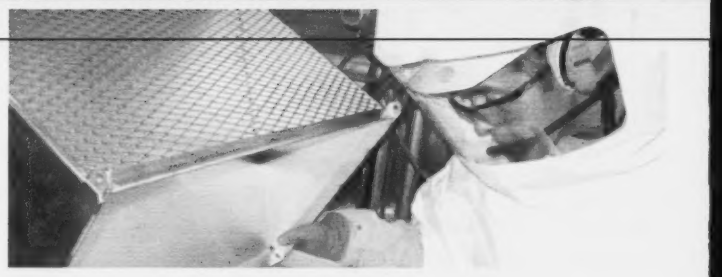


Photo Caption: A CNSC staff member inspects equipment for hydrogen management at the Bruce site. The devices, which do not require power to function, were recently installed as part of the short-term actions outlined in the CNSC action plan in response to the Fukushima Daiichi nuclear power plant accident

Restart of Bruce (Units 1 and 2)

The operating licences for Bruce A and Bruce B will expire on October 31, 2014. The CNSC approved fuel reload for Bruce A's Unit 1 in November 2011 and the restart of Unit 2 in March 2012. Bruce Power's refurbishment of Units 1 and 2 at Bruce A is approaching completion.

Continuous improvement: power reactor operating licences

The CNSC is currently revising the format of NPP operating licences to introduce standard licence conditions for all 14 safety and control areas. Each new licence is supported by a licence conditions handbook that describes the compliance verification criteria required to confirm safe operation. It is expected that all NPP operating licences will be subject to the new format by October 2014.

Enhanced communication through Early Notification Reports

Power plant operators are required to notify the CNSC of significant events that occur in the course of their operations. CNSC staff will present an Early Notification Report (ENR) to the Commission given certain criteria – including exceedances of regulatory limits for releases, or public or media interest. The number of ENRs in a given year is not, in itself, an indicator of the safety of Canada's NPPs. For example, most events reported in 2011 were generally of little or no safety significance and only reported due to media or public interest. Table 3 presents the number of ENRs received by the CNSC between 2007 and 2011.

Table 3: Early Notification Reports for Canadian nuclear power plants from 2007 to 2011

2007	2008	2009	2010	2011
13	9	7	18	15

SPOTLIGHT

Ensuring the Safe Extension of the Operating Lives of Canadian Nuclear Power Plants

Photo Caption: Aerial photo of Bruce site.

The CNSC oversees all life extension projects for nuclear power plants (NPPs), which may involve the replacement or refurbishment of major components and substantial design modifications.

All NPPs in Canada are of the CANDU design. A CANDU reactor is a pressurized heavy water reactor that uses natural uranium as fuel and heavy water as a coolant and moderator. It has a design life of approximately 30 years, after which major equipment and systems need to be refurbished and modernized. Having been built between the 1960s and the early 1990s, many of Canada's NPPs have already undergone refurbishment or will within the next decade.

As part of the planning to refurbish a facility and extend its operating life, the CNSC requires the operator to conduct an environmental assessment to address the cumulative impact over the extended life cycle and an integrated safety review (ISR). An ISR provides a thorough examination of the plant's design, condition and operation, in an effort to align with current codes and standards. In keeping with the objective of the ISR, the operator must strive to modernize systems, structures and components to bring the safety of the facility to a level comparable to that of a modern NPP.

In order to return refurbished units to service, facility operators must obtain several approvals from the CNSC. Those approvals include reload of the reactor fuel, restart of the reactor and operation towards full power.

Life Extension of Nuclear Power Plants (RD-360), available on the CNSC Web site at **nuclearsafety.gc.ca**, provides more information about the requirements for NPP refurbishment in Canada.

Nuclear power by the numbers

NPPs have been commercially producing electricity in Canada since the 1960s. Today, 7 NPPs in 3 provinces house 22 nuclear power reactors, with 17 in commercial operation, which have the capacity to generate more than 12,600 megawatts of power. Nuclear energy contributes about 15 percent of our country's electricity and 50 to 60 percent of the electricity generated in Ontario.

SAFE **NUCLEAR** MEDICINE

DIAGNOSING AND TREATING DISEASES

The CNSC regulates medical uses of nuclear substances and radiation devices, ensuring that equipment and treatments are safe for Canadians.

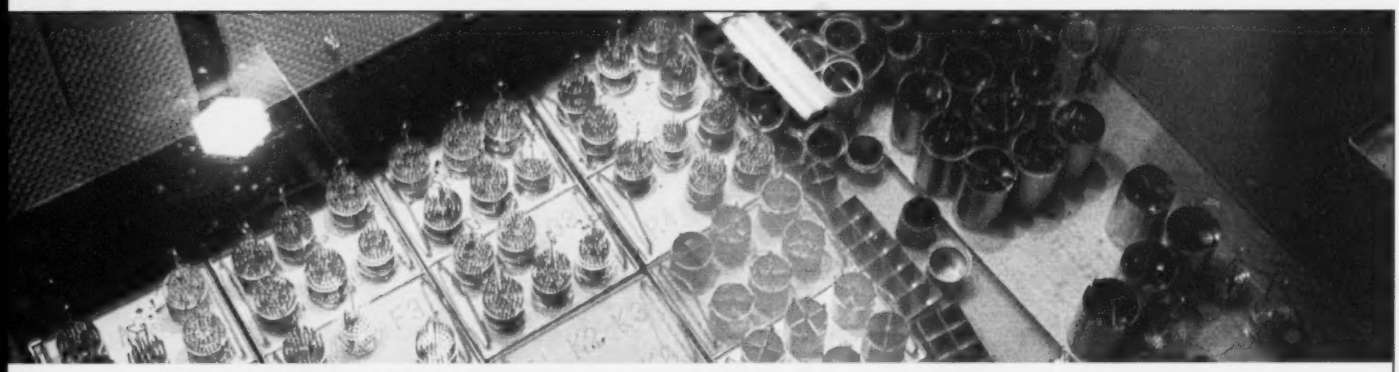


Photo Caption: A cobalt storage pool

SAFETY SUMMED UP

- The CNSC performed just over 200 inspections in the medical sector during 2011 to 12.
- The CNSC made sure that two licensees (Regina Qu'Appelle Health Region and Health Canada's National Dosimetry Service) addressed serious non-compliance issues with respect to their licensed activities within the CNSC's specified timeframe.
- There were 24 events reported in 2011, compared to 27 in 2008, 6 in 2009 and 18 in 2010. None of the events reported in the medical sector resulted in a radiation dose to the public in excess of regulatory limits.
- Data from sampled annual compliance reports in the medical sector demonstrate that from 2008 to 2010, around 90 percent of all medical sector employees received low occupational doses: doses were less than 0.5 millisieverts per year, significantly below the regulatory limit of 50mSv for nuclear energy workers.

The use of radiation in the treatment of cancer has a long history in Canada, beginning with cobalt-60 treatments in 1951. Today, radiopharmaceuticals are used in many diagnostic and therapeutic procedures for diseases of the thyroid, treatment of certain blood disorders, and site-specific treatment of many cancers.

High-energy electrons or photon beams are widely used to treat a variety of cancers. Medical linear accelerators and high-dose-rate brachytherapy machines are examples of equipment used for radiation therapy.

The CNSC verifies that medical licensees conform with the NSCA, as well as other regulations and licence conditions, by conducting onsite inspections and desktop evaluations of licensee policies and procedures. The CNSC is also responsible for regulating medical accelerators and Class II nuclear facilities, which include hospitals, and prescribed equipment in Canada. As of March 2012, the Canadian medical sector held just over 580 licences, which represented around 20% of all CNSC licences.

The CNSC recently expanded its regulatory authority to include all particle accelerators operating at a beam energy level of 1 megaelectron-volt (MeV) or more. Previously, the CNSC had only regulated higher-energy accelerators with power levels above 10 MeV. The decision to include low-energy accelerators reflected recent developments in accelerator technology, and will ensure adequate and consistent oversight over this class of equipment. The CNSC informed all affected licensees and manufacturers of this change through extensive outreach efforts, along with written notification of the new policy.

The equipment used in the medical sector by CNSC licensees falls under a category known as "Class II prescribed equipment". Medical licensees also use radiation devices, which must be certified. All Class II prescribed equipment and certified radiation devices are subject to CNSC regulations, and a complete list is available at **nuclearsafety.gc.ca**

SPOTLIGHT

Licensing Innovative Technology in Support of Stronger Isotope Supply

The CNSC licenses facilities equipped with particle accelerators, including cyclotrons, to ensure their safe operation. Recently, Canadian cyclotrons were used in novel research that promises to lead to a more plentiful, diversified supply of medical isotopes.

Technetium-99m (Tc-99m) is the most widely used radioisotope in diagnostic nuclear medicine in Canada and around the world. Roughly 25,000 nuclear medicine scans for diagnosing illnesses are performed every week in Canada using this radioisotope, making Tc-99m an important and highly sought-after nuclear substance.

Tc-99m is typically produced by research reactors. The Government of Canada recently finalized agreements to invest in four projects to develop new ways of producing this key medical isotope. The two-year, $35 million Non-reactor-based Isotope Supply Contribution Program is designed to advance cyclotron and linear accelerator technologies to achieve a more diverse and secure supply of Tc-99m, with less reliance on nuclear reactor- based production.

Technetium-99m (Tc-99m) is the most widely used radioisotope in diagnostic nuclear medicine in Canada and around the world.

A team of Canadian scientists – researchers from TRIUMF, B.C. Cancer Agency, Lawson Health Research Institute (London, Ontario), and the Centre for Probe Development and Commercialization, McMaster University, Hamilton, Ontario – recently

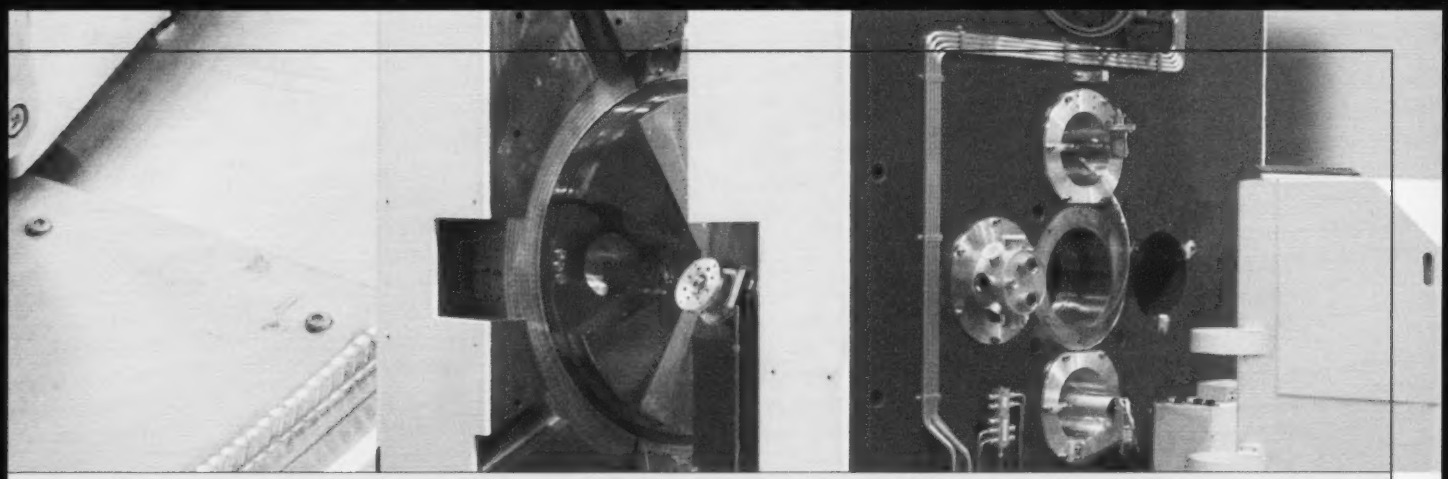


Photo Caption: Cyclotron of the type used to conduct the research led by TRIUMF at the University of British Columbia to advance and diversify the production of Technetium-99m.

produced Tc-99m using cyclotrons (a type of particle accelerator that is certified by the CNSC) in British Columbia and Ontario. This marked a significant accomplishment that will help assure a continued steady supply of this isotope, bringing good news to thousands of Canadians – and many others around the world – who benefit from procedures that use Tc-99m to diagnose cancer, heart and bone diseases.

Technetium-99m

Each year, 50 million nuclear medical body scans are performed around the world. Roughly 80 percent of these procedures use technetium-99m.

The use of a cyclotron, as opposed to a nuclear reactor, to produce medical isotopes has potential of an additional benefit: a reduction in waste. Since cyclotrons generate less long-lived waste than research reactors, they offer hope for a viable and sustainable alternative for producing Tc-99-m with minimal environmental impact. The CNSC is monitoring closely this type of work – which benefits Canadians' health while protecting the environment for current and future generations and – is committed to ensuring the continued safe operation of Canadian cyclotrons.

SAFE NUCLEAR SUBSTANCES AND TRANSPORT

NUCLEAR TECHNOLOGY CONTRIBUTES TO EVERYDAY LIFE AND WELL-BEING

From licensing the possession of nuclear substances to overseeing the safe transport of nuclear material, the CNSC always ensures effective regulatory oversight of all uses of nuclear-related substances in industry, academia and the commercial sectors.

Photo Caption: A CNSC inspector takes a reading of a transportation container.

SAFETY SUMMED UP

- The CNSC performed over 1,400 inspections in the academic, commercial and industrial sectors.
- The CNSC issued 15 orders to licensees across the industrial/academic sector during the reporting period and 1 non-compliance request to Memorial University. The licensees complied with the orders in a timely fashion, and the CNSC confirmed that all the terms and conditions of the orders were met.
- The CNSC issued 27 new certificates for radiation devices in 2011 to 12.
- During 2011 to 12, the CNSC issued 47 certificates for package design and for special form radioactive material.
- As of March 2012, the CNSC managed 113 industrial radiography licences.
- Data from sampled annual compliance reports in the industrial, academic, research and commercial sectors demonstrate that, from 2008 to 2010, the vast majority of nuclear energy workers received less than the public dose limit of 1 millisievert per year. This is significantly less than the regulatory limit of 50 millisieverts per year for nuclear energy workers. Overall compliance in the safety and control areas assessed by inspectors improved in 2011.
- Industrial radiography doses to certified exposure device operators averaged under 2 millisieverts per year.

Nuclear technology touches many aspects of everyday life. Nuclear technology is used in smoke detectors and photocopiers. It is used to scan baggage at airports, to check surface density in road construction, to authenticate and restore paintings and other artwork in museums, to irradiate silicon for hybrid car parts, in photocopiers, and to test airplane parts. While end-users of these devices do not require a licence, the manufacturing and distribution of the devices in Canada are licensed by the CNSC.

In **academia**, devices such as linear accelerators are used primarily for teaching and applied research, while nuclear substances are licensed for use in life science and health care research projects at a wide range of institutions across Canada.

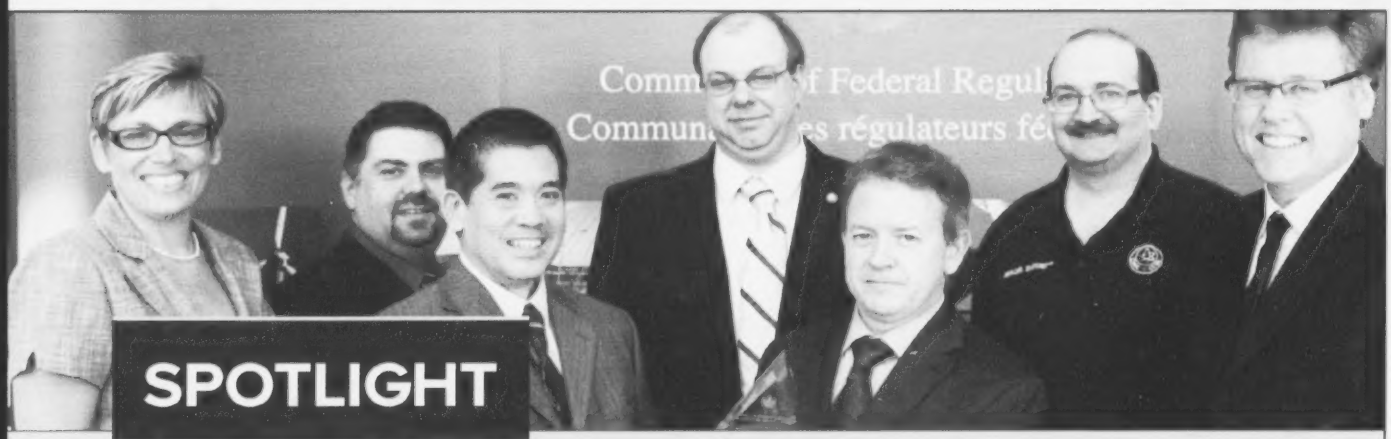
Commercial uses of nuclear substances mainly involve fixed and portable gauges and exposure devices, used to ensure the integrity of pipelines and to analyze ground density. Servicing licences often include the installation and dismantling of radiation devices.

Industrial uses of nuclear substances include industrial radiography, in which high-radioactivity sealed sources are used to assess the integrity of certain materials (a sealed source is a radioactive substance that is sealed in a container). Before an individual may possess, use or store these devices, he or she requires a licence issued by the CNSC. Radiographers who operate the devices must be certified by the CNSC.

As of March 2012, the industrial sector accounted for over 1,455 licences, the academic and research sector for 270 and the commercial sector for 583. The CNSC focuses its inspections where risk is highest and where it has concerns about the licensee's performance. The CNSC has a program in place to ensure that lost or stolen nuclear substances and radiation devices are tracked and recovered as soon as possible.

Canada is both a significant producer and major shipper of nuclear substances. The CNSC shares responsibility with Transport Canada for overseeing the transport of more than a million packages containing nuclear substances in Canada per year. The CNSC's role focuses on protecting the health, safety and security of people, and protecting the environment. While a small number of packages were involved in transport-related incidents, the overall safety record was excellent, with no damage to packaging or no impact to workers or the environment.

Photo Caption: A CNSC inspector examines a vehicle cargo container



SPOTLIGHT

CNSC Team Responds Swiftly to *MCP Altona* Incident

Photo Caption: Sylvain Faille (back row, centre), accepts the 2012 Regulatory Excellence Award for Exceptional Performance in Compliance and Enforcement on behalf of the CNSC.

The CNSC is committed safe environmental remediation and effective enforcement of licence conditions.

For 15 weeks, CNSC staff conducted an onsite response to an incident involving the cleanup and removal of uranium concentrate (also called yellowcake) aboard the marine vessel *MCP Altona* in Vancouver.

On January 14, 2011, Cameco Corporation informed the CNSC that the vessel had sustained damage after it encountered extremely rough sea conditions on a trans-Pacific voyage. Several drums of uranium concentrate being transported onboard the vessel broke open during the voyage. As a result, the vessel was forced to return to Vancouver, where Cameco, the nuclear licensee responsible for the uranium concentrate, undertook the clean-up of the vessel cargo hold and recovery of the uranium.

The CNSC sent a response team to inspect the vessel offshore before it was determined that the licensee could safely undertake cleanup operations. CNSC involvement in this incident spanned a five-month period from January to May 2011. Hours of work were at times gruelling, and CNSC inspectors worked upwards of 16-hour days, seven days a week. As part of their duties, CNSC staff onsite verified radiation monitoring results and conducted their own measurements, including over 500 surface contamination wipes taken on the vessel, workers' equipment and clothing, and transport packages, prior to releasing the vessel. CNSC management also ensured efficient coordination between the geographically distant teams, as well as smooth interactions with other local and government organizations, such as WorkSafeBC and Transport Canada.

At the end of the cleanup work, CNSC staff reviewed Cameco's final radiation survey results and conducted their own independent measurements to confirm that no uranium concentrate was present on board the *MCP Altona*. Support from key radiation protection staff and the CNSC's new Limebank lab was invaluable. The vessel was released from CNSC regulatory control on May 5, 2011.

Thanks to the CNSC's multidisciplinary response team, onsite leadership, and dedication, and commitment to the various tasks, the CNSC was able to demonstrate successfully that this event presented no risk to the health and safety of workers, the public or the environment, and the vessel was allowed to return to its normal use.

The team won a Community of Federal Regulators 2012 Regulatory Excellence Award for Exceptional Performance in Compliance and Enforcement.

SAFE **WASTE** MANAGEMENT

SECURE STORAGE FOR FUTURE GENERATIONS

Radioactive waste in Canada is strictly regulated by the CNSC to ensure it poses no undue risks to people or the environment.

SAFETY SUMMED UP

- Doses to the public did not exceed regulatory limits.
- Doses to workers at waste facilities did not exceed regulatory limits.
- No regulatory releases from the waste facilities exceeded regulatory limits.

In 2011 to 12, we oversaw the management of several ongoing projects. Among the projects were those at the waste management facilities at Darlington and Pickering, as well as the Western Waste Management Facility, all operated by Ontario Power Generation (OPG), along with the decommissioning of AECL's Whiteshell Laboratories in Pinawa, Manitoba. In addition, we focused on some major proposed waste-related projects, including Cameco's Vision 2010 Port Hope decommissioning project, OPG's Deep Geological Repository for storing low- and intermediate-level waste, and the Adaptive Phased Management Project of the Nuclear Waste Management Office (NWMO), for managing high-level fuel waste.

The Government of Canada selected the NWMO's recommendation of adaptive phased management for the long-term care of used nuclear fuel. The CNSC met with stakeholders to share information about the project, including participation in the Commission hearing process, Aboriginal consultation, and the processes for the EA and project licensing. More information can be found in the spotlight on p. 48. The NWMO is planning to conclude this "expression of interest" phase of the site selection process on September 30, 2012.

Photo Caption: Image of a deep geological repository.

PORT HOPE AREA INITIATIVE

The Port Hope Area Initiative is a federal project to clean up and safely provide for the management of low-level radioactive waste in the Port Hope and Clarington area. The initiative involves two separate projects: the Port Hope Project and the Port Granby Project.

The Port Hope Project involves the cleanup of contaminated sites in the Municipality of Port Hope and the storage and management of wastes in a new waste-management facility to be located there. The Port Hope project, having earlier completed the EA stage, was granted a waste nuclear substance licence in 2009, with conditions that had to be met before construction could begin. Licensing assessments are under way, and it is expected that a licence amendment hearing will be scheduled during the second half of 2012 to consider the construction of the waste management facility and remediation of contaminated sites.

The Port Granby Project is a proposal for the management of wastes currently in a radioactive waste-management facility in the Municipality of Clarington. The project has completed the EA phase and was granted a waste nuclear substance licence in 2011, allowing the project to proceed.

OTHER INITIATIVES

The Government of Canada's Nuclear Legacy Liabilities Program continues to provide a long-term strategy to manage legacy waste and contamination on AECL sites, including Chalk River Laboratories and Whiteshell Laboratories. The CNSC regulates all projects under this program.

The Whiteshell Laboratories facility is a former nuclear research and test establishment in Manitoba, on the east bank of the Winnipeg River. It is currently undergoing decommissioning in accordance with CNSC regulations.

SPOTLIGHT

Inspiring Confidence in Communities Through Expertise and Commitment to Safety

Photo Caption: Representatives from the community of Wawa visited the CNSC's headquarters in Ottawa in 2011.

The CNSC reaches out as part of the Adaptive Phased Management project.

The CNSC gets involved early in proposed nuclear projects to ensure that Canadians understand our role in regulating Canada's nuclear sector. Several communities have participated in day-long presentations by the CNSC to learn about our part in the Adaptive Phased Management (APM) project of the Nuclear Waste Management Organization (NWMO).

APM is a process to find socially acceptable, technically sound, environmentally responsible and economically feasible solutions for the long-term management of used nuclear fuel. The CNSC has signed a service agreement with the NWMO to provide regulatory guidance and support for implementing APM.

As part of the agreement, the CNSC conducts pre-project design reviews of reports that the NWMO submits to the APM, about the proposed deep geological repository for the long-term management of used nuclear fuel. To conduct outreach and undertake reviews on the project, the CNSC has gathered a robust team of experts from various disciplines that include geology, hydrogeology, geomechanics, geochemistry, environmental and human risk assessment, and radiation protection.

In May 2010, as part of the APM approach, the NWMO launched a process to select a community willing to host a deep geological repository. As of March 2012, 15 communities had expressed interest and the CNSC has since met with 8 of them.

The exchange of information between communities and the CNSC has been lively and has touched on various issues, from the Commission hearing process to Aboriginal consultation and environmental assessments. Feedback from communities has been positive: they feel sure that the CNSC is a neutral, independent body, and are confident it has the right people to evaluate repositories for used nuclear fuel and who are concerned with safety first and foremost.

To learn more about the CNSC's early role in the APM project, visit **nuclearsafety.gc.ca**

NATIONAL SECURITY AND INTERNATIONAL COMMITMENTS

WE LEAD INTERNATIONALLY

Canada is a world leader in promoting the peaceful use of nuclear energy. To fulfill Canada's international obligations, the CNSC supports and implements our country's international agreements in the area of nuclear non-proliferation and security.

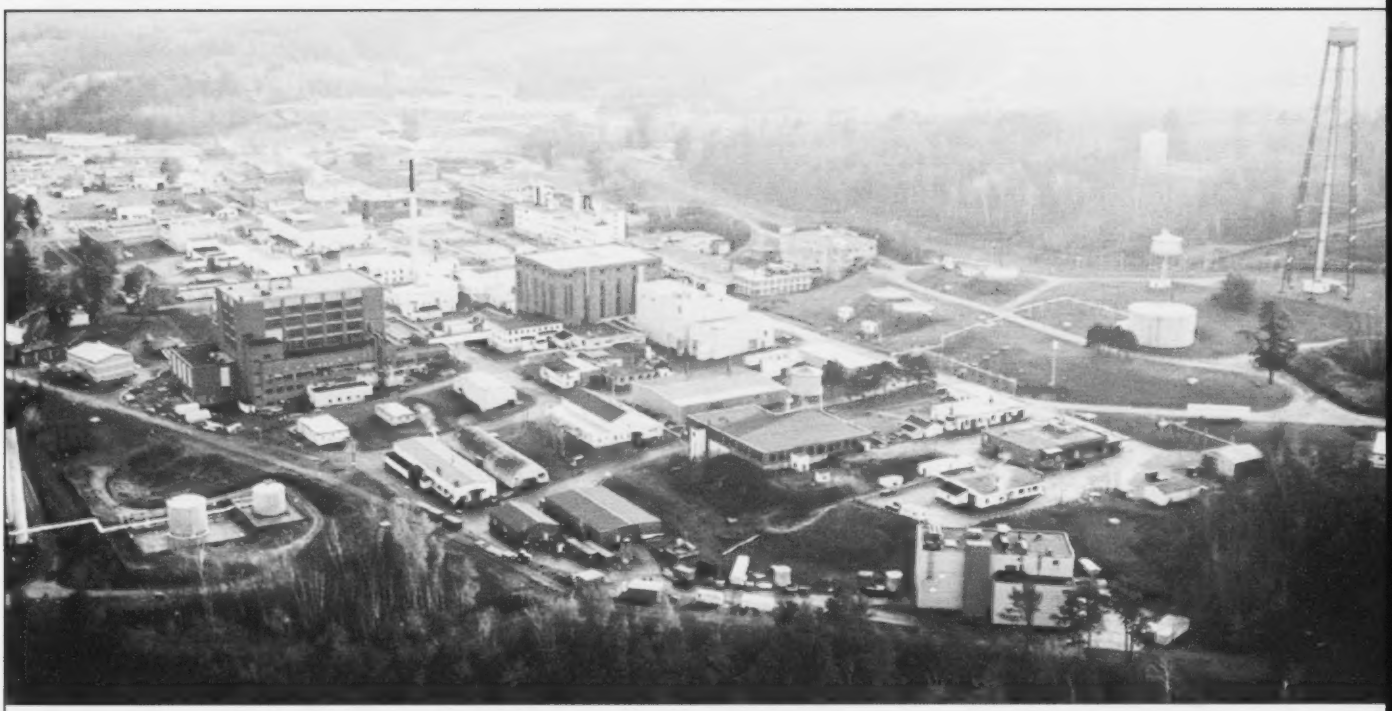


Photo Caption: In March 2012, Prime Minister Stephen Harper announced the expansion of efforts with the United States to return additional inventories of highly enriched uranium to the U.S. These inventories are currently safely and securely stored at the Atomic Energy of Canada Ltd.'s Chalk River Laboratories located north of Ottawa, Ontario, and are subject to the CNSC's strict regulatory oversight. Any transportation of these materials is also subject to rigorous regulatory controls.

INTERNATIONAL COOPERATION **SUMMED UP**

- As of 2011 to 12, 27 nuclear cooperation agreements were in place between Canada and other countries, and more are on the horizon. The CNSC provides technical expertise to the Department of Foreign Affairs and International Trade in the negotiation of these agreements, and is responsible for implementing the agreements through administrative arrangements negotiated with its regulatory counterparts.
- The CNSC also signed an amended administrative arrangement with Rosatom, its counterpart in the Russian Federation.
- In 2011 to 12, the CNSC signed three new memoranda of understanding on regulatory cooperation with other countries, bringing the total to 11.
- The CNSC signed three new bilateral administrative arrangements with its counterparts in Peru, Chile and Italy for the purpose of harmonizing regulatory controls on the import and export of radioactive sources, pursuant to the IAEA *Code of Conduct on the Safety and Security of Radioactive Sources*.

Photo Caption: CNSC President Michael Binder and Dr Chang Sun Kang, Chairman and Chief Regulatory Officer, Nuclear Safety and Security Commission of the Republic of Korea.

The major elements of Canada's nuclear non-proliferation policy involve international non-proliferation, safeguards and security commitments. Canada has been actively involved in international promotion of the peaceful use of nuclear energy.

COMMITMENTS

Treaty on the Non-proliferation of Nuclear Weapons: This treaty aims to prevent the spread of weapons, promote cooperation in the peaceful use of nuclear energy, and achieve nuclear disarmament. Canada was one of the first to sign this treaty in 1970. The CNSC makes sure that Canada complies with its obligations under this agreement.

Imports/exports: The CNSC works to ensure that Canada's nuclear exports are not used to develop any kind of nuclear weapon or explosive device. The CNSC also works hard to promote a stronger system for the safe use of nuclear substances internationally. In 2011 to 12, the CNSC issued 738 export and 91 import licences; 186 of these export licences were issued for risk-significant radioactive sources.

Nuclear safeguards: Safeguards are systems used by the IAEA to make sure that nuclear substances intended for peaceful purposes are not used instead to produce nuclear weapons. In 1972, Canada was the first country to bring in a broad safeguard agreement with the IAEA. In 2000, Canada added the "Additional Protocol", which gives the IAEA even more access to our activities.

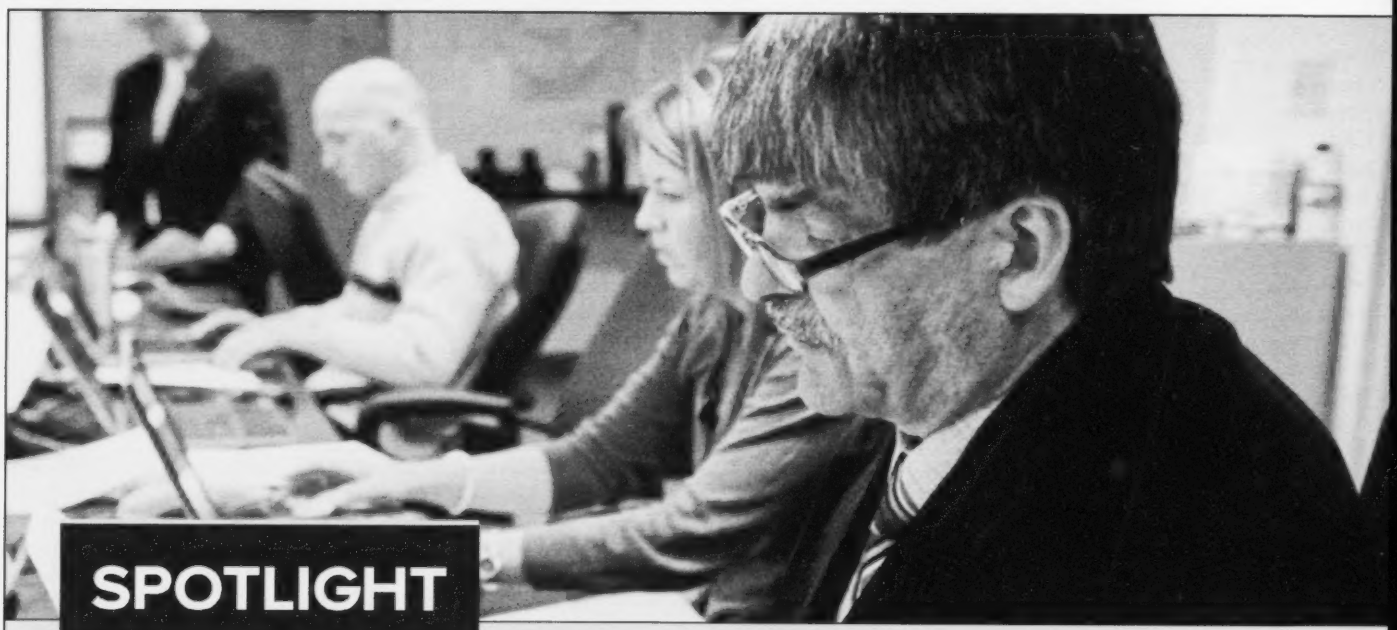
In 2011, Canada once again received a positive safeguards conclusion from the IAEA, providing the highest possible level of assurance that all nuclear material in Canada was used for peaceful activities. Canada is one of 58 countries, out of 178 member states, that received this result.

REGULATORY MILESTONES AND HIGHLIGHTS

Towards an information-driven safeguards system: Over the course of 2011 to 12, the CNSC continued to work toward the streamlining of safeguards as implemented in Canada, by supporting the IAEA's evolution toward a safeguards system that is driven by comprehensive information analysis, rather than by prescriptive, rigid criteria. Canada has long been at the forefront of advocating this shift in thinking

Transfer of used fuel: The CNSC, through its Canadian Safeguards Support Program, ensured the successful installation of equipment to monitor the transfer of CANDU spent fuel from wet to dry storage at the Point Lepreau Generating Station. With the completion of this installation, all Canadian CANDU facilities are now able to transfer spent fuel to dry storage without requiring the presence of an IAEA inspector.

A Canadian innovation to serve in Japan: Another highlighted activity is the IAEA's approval of the Canadian/Swedish Digital Cerenkov Viewing Device as a partial defect identifier of spent fuel from light water reactors. This device will now be employed to verify spent fuel when it is transferred to TEPCO's Fukushima Daiichi nuclear generating station.



SPOTLIGHT

Testing Emergency Preparedness

Photo Caption: Regular emergency practice drills are conducted by nuclear power plant operators as well as municipal, provincial and federal agencies in charge of responding to nuclear incidents and accidents. On March 28, 2012, NB Power, operator of the Point Lepreau Generating Station, conducted a large-scale exercise. NB Power's Joe McCulley, Senior Health Physicist (far right), provides expertise in health physics during the exercise.

The CNSC regularly participates and evaluates exercises being carried out to test and validate emergency preparedness at major nuclear sites.

To ensure the safety of Canadians and the environment, the CNSC requires all major nuclear facilities in Canada to have comprehensive emergency management programs in place to deal with any incident that may occur at their sites. These plans must work cooperatively with the plans of other stakeholders, including the CNSC, provinces and municipalities, and other federal stakeholders.

In addition to their emergency plans and procedures, licensees must also maintain dedicated emergency response facilities and equipment, and an emergency response organization comprised of qualified and trained staff.

The CNSC requires nuclear facilities in Canada to conduct regular tests of their emergency management systems and response organizations. In 2011 to 12, all nuclear facilities in Canada met the CNSC's regulatory compliance expectations.

The role of the CNSC during a nuclear or radiological emergency is to:

- monitor licensee responses
- evaluate actions taken by emergency responders for safety and to maintain regulatory control
- provide technical advice as required
- take regulatory action, including Issuing emergency orders, as required
- provide field response assistance to local authorities, when requested or needed
- keep the government and the public informed of the CNSC assessment of the situation.

PERFORMANCE TESTING PROGRAM

The CNSC has completed the second cycle of its Performance Testing Program (PTP) at high-security nuclear facilities, including NPPs and AECL's Chalk River Laboratories. The PTP has proven to be an effective means of testing and validating that a licensee's physical protection systems are adequate and comply with performance and regulatory requirements.

The CNSC continues to utilize the Canadian Adversary Testing Team (CATT) during these performance testing exercises, to play the role of a credible adversary in safe, realistic and challenging scenarios.

As part of the PTP at Canadian high-security nuclear facilities, CATT members participate as adversary force members during exercises and drills at high-security nuclear sites. These exercises are evaluated, and the results of these evaluations serve as a means to continually develop and improve the physical protection at Canadian high-security nuclear facilities in order to meet regulatory requirements. There are currently 18 CATT volunteers from six nuclear response forces for high-security sites.

With the conclusion of this second cycle of exercises, licensees have demonstrated they are addressing lessons learned from the performance testing security validation exercises, in order to enhance security.

The program will continue to evolve in order to ensure that testing remains current and relevant and that all aspects of the physical protection system (detection, delay and response) are realistically tested and assessed.

The CNSC will continue to consult industry stakeholders to ensure the program is administered efficiently and that its current collaborative effort remains in place to achieve program sustainability. The PTP will also continue to be benchmarked against other international programs.

STAKEHOLDER **RELATIONS**

REACHING OUT TO CANADIANS

CNSC staff travel from coast to coast, visiting Canadians in their communities and answering their questions on how we regulate nuclear safety. This ongoing dialogue is important for increasing public understanding and trust in our role of protecting Canadians, their health and the environment.

Photo Caption: CNSC outreach in the community (Mistissini, Quebec)

OUTREACH ACTIVITES **SUMMED UP**

- The CNSC's President, executive team and CNSC personnel continued to deliver presentations in such forums as the Canadian Nuclear Association, Parliamentary Standing Committees, international delegations, the Canadian Nuclear Law Organization, and the International Nuclear Regulators Association.
- Close to 40 public presentations by CNSC experts and executives were made in Canada and abroad,
- The CNSC proactively reached out to Canadians by issuing email notifications of important nuclear safety information to over 1,600 subscribers, and responded to hundreds of questions from the media, public and stakeholders.

The CNSC's stakeholder outreach this past year has been important. Beyond our usual outreach activities, we communicated extensively with Canadians during the course of TEPCO's Fukushima Daiichi nuclear accident in Japan, and throughout the months that followed. This resulted in an increased public interest throughout the country, related to the hearings in New Brunswick for the renewal of the Point Lepreau Generating Station licence. Canadians also responded to outreach efforts in northern Saskatchewan concerning the CNSC's oversight of mining operations, such as the Cameco Key Lake Extension Project. The CNSC also held many other community events, including several briefings about the CNSC's role in the Nuclear Waste Management Office's Adaptive Phase Management Project, which is working to find a host community for high-level nuclear waste.

CONSULTATION WITH ABORIGINAL PEOPLES

The CNSC consults with Canada's Aboriginal Peoples about some of its decisions, especially if a decision could affect Aboriginal People's rights. In such cases, CNSC staff make a point of involving Aboriginal peoples early on in the decision-making process.

In 2010, the CNSC set up the codification of current practices, an official list of the ways to consult with Aboriginal Peoples, demonstrating our commitment to effective, open and clear consultation. The CNSC also gives Aboriginal Peoples objective information about the nuclear industry's activities and its potential effects.

In 2011, CNSC staff participated in many community meetings, open houses, technical workshops and site visits with Aboriginal groups in Saskatchewan, Ontario, Nunavut and Northern Quebec.

SPOTLIGHT

Inviting Meaningful Public Input Through Participant Funding

The CNSC values the participation of Canadians, who bring valuable information to Commission deliberations.

In 2011, the CNSC launched its Participant Funding Program (PFP). This program was established to give the public, Aboriginal groups and other stakeholders the opportunity to request funding from the CNSC to participate in its regulatory processes. This program demonstrates the CNSC's continued commitment to meaningful public and Aboriginal participation in nuclear review processes, while strengthening regulatory performance and protecting the environment.

The PFP has the following objectives:

- to enhance Aboriginal, public and stakeholder participation in the CNSC EA and licensing process
- to help stakeholders bring value-added* information to the Commission, through informed and topic-specific interventions related to aspects of EAs and licensing.

The PFP is available to eligible stakeholders whose proposed activities are related to aspects of EAs and/or a licensing action for major nuclear facilities. Funding may also be available for CNSC proceedings that are of significant interest to the public or to Aboriginal groups.

Eligible recipients are individuals, community members, Aboriginal groups, not-for-profit corporations and other stakeholders who have:

- a direct, local interest in the project, such as living or owning property near the project area
- Aboriginal traditional knowledge and/or local community insight relevant to the proposed project
- interests in potential project impacts on treaty lands, settlement lands or traditional territories and/or related claims and rights
- plans to provide value-added information relevant to the CNSC's mandate and specific matters at Commission public proceedings.

* Value-added information is new, distinctive and relevant information that contributes to a better understanding of the anticipated effects of a project.

The CNSC continues to adjust the PFP based on its experience with the program to date, drawing on input from both staff and participants.

COMMISSION MEMBERS

INDEPENDENT AND TRANSPARENT DECISION MAKING

PERMANENT MEMBERS

Mr. Michael Binder

President and Chief Executive Officer, Canadian Nuclear Safety Commission Ottawa, Ontario

Named as a permanent member on January 15, 2008

Dr. Ronald J. Barriault

Physician, Restigouche Regional Health Authority Charlo, New Brunswick

Named as a permanent member on December 3, 2007

Mr. André Harvey

Québec City, Québec

Named as a permanent member on June 2, 2006

Dr. J. Moyra J. McDill

Professor, Department of Mechanical and Aerospace Engineering, Carleton University Ottawa, Ontario

Named as a permanent member on May 30, 2002

Mr. Dan Tolgyesi

President of Québec Mining Association Québec City, Québec

Named as a permanent member on May 30, 2008

Ms. Rumina Velshi

Toronto, Ontario

Named as a permanent member on December 15, 2011

TEMPORARY MEMBERS

Dr. James Archibald

Professor of mining engineering, Queen's University, Ontario

Temporary member, currently appointed to the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Joint Review Panel

Ms. Jocelyne Beaudet

Lunenberg, Nova Scotia

Temporary member, currently appointed to the Darlington Joint Review Panel

Mr. Alan R. Graham

Rexton, New Brunswick

Temporary member, currently Chair of the Darlington Joint Review Panel

Dr. Gunter Muecke

Professional geologist

Temporary member, currently appointed to the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Joint Review Panel

Mr. Ken Pereira

Ottawa, Ontario

Temporary member, currently appointed to the Darlington Joint Review Panel

Dr. Stella Swanson

Environmental consultant

Temporary member, currently Chair of the Deep Geologic Repository for Low and Intermediate Level Radioactive Waste Joint Review Panel

The Commission is a quasi-judicial administrative tribunal. The Commission makes independent, fair and transparent decisions on the licensing of major nuclear-related activities. It also makes legally binding regulations and sets regulatory policy direction on matters related to the protection of health, safety, security and the environment and to the implementation of international obligations respecting peaceful uses of nuclear energy.

Before the Commission decides whether to license a nuclear-related activity, it considers applicants' proposals, recommendations from CNSC personnel, and stakeholder views. Each licensing decision is based on information that demonstrates the operation of a given facility can be carried out safely and that the environment is protected. To promote openness and transparency, the Commission conducts its business where possible in public hearings and meetings and, where appropriate, in communities affected by its decisions. Aboriginal people and other members of the public can participate in public hearings via written submissions and oral presentations. Commission hearings and meetings can be viewed online as webcasts at **nuclearsafety.gc.ca**, where transcripts of public hearings and meetings are also available after the proceedings.

The Commission has up to seven permanent members, appointed by the Governor in Council and chosen according to credentials. All are independent of political, governmental, special interest group or industry influences. Temporary members can be appointed by the Governor in Council when necessary. The CNSC President is the only full-time Commission member.

In 2000, the *Nuclear Safety and Control Act* came into force, superseding the *Atomic Energy Control Act* and marking the transition to a stronger Canadian regulatory regime. The new Act marked the first major update of Canada's nuclear regulatory regime since the AECB was established in 1946.

MANAGEMENT DISCUSSION

CANADIAN NUCLEAR SAFETY COMMISSION MANAGEMENT DISCUSSION AND ANALYSIS OF THE STATEMENT OF OPERATIONS FOR THE YEAR ENDED MARCH 31, 2012

The Canadian Nuclear Safety Commission (CNSC) prepares, on an annual basis, a full set of audited financial statements as required under the *CNSC Cost Recovery Fees Regulations* (CRFR). Included in the audited Statement of Operations is information on the planned results for the current fiscal year as set out in the Future-Oriented Statement of Operations (FOSO) published with the *2011 to 2012 Report on Plans and Priorities*.

The purpose of the CNSC Management Discussion and Analysis (MDA) is to provide the financial statement reader with information on significant variances between the planned results and the actual results for the operations of the 2011 to 12 fiscal year, as well as between the actual results for the 2011 to 12 and the 2010 to 11 fiscal years' operations. The discussion and analysis generally proceeds in the order that the expenditures and revenues appear in the Statement of Operations.

The first significant variances arise between the planned and actual Salaries and employee benefits and the Licence fees for the 2011 to 12 fiscal year were due to an assumption made in the preparation of the FOSO with respect to the loss of temporary incremental funding. The loss of the temporary incremental funding, for activities associated with fee-exempt licensees and non-cost recoverable, would have required the CNSC to reduce employee levels and begin to charge fees to licensees who provide a public good or service, including hospitals and higher education institutions. In the Budget 2012, the government confirmed its commitment to providing fee-exempt services to certain licensees and non-cost-recoverable international activities.

Professional and special services increased significantly for the current and prior fiscal year and against the planned expenditure level for 2012. This variance is due to the transfer of information technology (IT) infrastructure responsibilities to the newly created Shared Services Canada (SSC). The CNSC pays SSC for the infrastructure services received and records the charge under Professional and special services. Prior to the 2011 to 12 fiscal year, the CNSC met its IT infrastructure needs internally through salaried employees.

The CNSC meets its office space requirements through a combination of Services without charge from Public Works and Government Services Canada and partial lease payments from revenues. During the current fiscal year, the CNSC negotiated a lease renewal, which resulted in an increase in the cost of accommodations and in the proportion of lease payments from revenues to 34% from 22% of total accommodation costs.

For furniture, repairs and rentals and communication and information the CNSC experienced a decrease in actual expenditures against the planned results as well as against the prior fiscal year. The planned results reflected estimates for the cost of completing the realignment of offices, including furniture and equipment, a multi-year project begun in the 2009 to 10 fiscal year, at the CNSC's headquarters' building that were higher than the actual cost of replacing desktop informatics equipment. It should be noted that while the costs of furniture and communication equipment are expensed in accordance with the CNSC's accounting policies, the realignment project included a significant capitalized leasehold improvement asset component. The completion of the realignment project and commencement of amortization of the resulting asset in the 2011 to 12 fiscal year is reflected in the significant increase in the actual amortization expense in comparison to both the planned and prior year's expense.

The CNSC Program provides funds through its Grants and Contributions program to public institutions on a variety of nuclear research subjects and in the current year implemented the new Participant Funding Program (PFP). The PFP was established to give the public, Aboriginal groups and other stakeholders the opportunity to request funding from the CNSC to participate in its regulatory processes. The CNSC actively promotes the availability of these funds and reflects the importance of this program by planning for the full disbursement of all funds. While the CNSC experienced a significant increase in the requests received in the current year against the prior year, the goal set out in the planned results was not achieved.

Finally, the variance between the planned and actual results for the special projects revenues reflects the increase in special project activity resulting from the announcement by the Province of Ontario in the summer of 2011 of its intention to pursue nuclear options in its long-term electricity strategy.

CNSC MANAGEMENT TEAM

Terry Jamieson
Vice President, Technical Support

Jacques Lavoie
Senior General Counsel and Director of Legal Services

Michel Cavallin
Vice President, Corporate Services, and Chief Financial Officer

Michael Binder
President and Chief Executive Officer

Gordon White
Vice President, Regulatory Affairs, and Chief Communications Officer

Marc Leblanc
Commission Secretary

Ramzi Jammal
Executive Vice President, Regulatory Operations, and Chief Regulatory Operations Officer

FINANCIAL **STATEMENTS**

ARE AVAILABLE ONLINE, **CLICK HERE.**

ANNEX A

COMMISSION HEARINGS AND OPPORTUNITIES TO BE HEARD

HEARINGS

Nuclear power plants

Hydro-Québec:

- Decision to renew the Gentilly-2 Nuclear Generating Station and its waste management facility operating licences for a period of five years – Public hearing (December 10, 2010 and April 13 to 14, 2011)
- Decision to amend Hydro-Québec's licence to operate the Gentilly-2 Nuclear Generating Station – Abridged hearing (February 7, 2012)

New Brunswick Power Nuclear Corporation:

- Decision to amend the Point Lepreau Generating Station power reactor operating licence – Abridged hearing (August 26, 2011)
- Decision to accept the request for approval to reload fuel and restart the Point Lepreau Generating Station, and application to renew the power reactor operating licence for the Point Lepreau Generating Station – Public hearing (October 6 and December 1 and 2, 2011)

Ontario Power Generation Inc.:

- Decision to amend the Pickering Nuclear Generating Station A power reactor operating licence to reflect administrative changes – Abridged hearing (June 30, 2011)
- Decision to amend the Darlington Nuclear Generating Station power reactor operating licence to reflect updates in documentation – Abridged hearing (May 31, 2011)
- Decision to amend the Pickering Nuclear Generating Station B power reactor operating licence to reflect updates in documentation – Abridged hearing (May 31, 2011)
- Decision to accept the EA scoping information document (scope of project and assessment) for the proposed Darlington Nuclear Generating Station refurbishment and continued operation – Abridged hearing (October 28, 2011)
- Decision to amend the Darlington Nuclear Generating Station power reactor operating licence to reflect updates in documentation – Abridged hearing (November 22, 2011)
- Decision to amend the Pickering Nuclear Generating Station A power reactor operating licence to reflect updates in documentation – Abridged hearing (November 22, 2011)
- Decision to amend the Pickering Nuclear Generating Station B power reactor operating licence to reflect updates in documentation – Abridged hearing (November 22, 2011)
- Decision to amend the Darlington Nuclear Generating Station power reactor operating licence to reflect an update in documentation – Abridged hearing (February 7, 2012)
- Decision to amend the Pickering Nuclear Generating Station B power reactor operating licence to reflect an update in documentation – Abridged hearing (February 7, 2012)
- Decision to amend the Pickering Nuclear Generating Station B power reactor operating licence – Abridged hearing (February 24, 2012)
- Decision to amend the Pickering Nuclear Generating Station B power reactor operating licence – Abridged hearing (March 29, 2012)

URANIUM MINES AND MILLS

Cameco Corporation:

- Decision to amend the Blind River Fuel Facility operating licence – Abridged hearing (June 9, 2011)
- Decision to accept the proposed project-specific guidelines scoping document for the Eagle Point Water Management Project, Rabbit Lake Operation – Abridged hearing (April 21, 2011)
- Decision to accept the EA screening report for the Cigar Lake Water Inflow Management Project – Abridged hearing (June 23, 2011)

- Decision to accept the proposed project-specific guidelines scoping document for the preparation of an environmental impact statement for Cameco Corporation's Key Lake Extension Project – Abridged hearing (August 12, 2011)
- Decision to renew the nuclear fuel facility operating licence for the Blind River Refinery – Public hearing (November 3, 2011, and January 19, 2012)
- Decision to renew the operating licence for Cameco Fuel Manufacturing Inc. in Port Hope, Ontario – Public hearing (November 3, 2011, and January 18 and 19, 2012)
- Decision to renew the Class IB nuclear fuel facility operating licence for the Port Hope Conversion Facility – Public hearing (November 3, 2011, and January 17 and 18, 2012)
- Decision to amend the McArthur River Uranium Mine operating licence – Abridged hearing (March 22, 2012)

Strateco Resources Inc.:

- Decision to accept the comprehensive study report regarding the proposed underground uranium exploration project in Matoush, Quebec – Abridged hearing (July 29,2011)

Processing and research facilities

AECL:

- Decision to amend the Chalk River laboratories operating licence to reflect updates in documentation – Abridged hearing (April 29, 2011)
- Decision to amend the Dedicated Isotope Facilities operating licence to reflect updates in documentation – Abridged hearing (April 29, 2011)
- Decision to amend the Chalk River Laboratories operating licence for the undertaking of decommissioning activities at two facilities – Abridged hearing (August 5, 2011)
- Decision to accept a waste nuclear substance licence for the Port Granby Project – Public hearing (September 27, 2011)
- Decision to renew the Chalk River Laboratories nuclear research and test establishment operating licence – Public hearing (June 8 and October 4, 2011)
- Decision to accept the EA screening regarding the proposal to decommission the plutonium tower at Chalk River Laboratories in Chalk River, Ontario – Abridged hearing (December 16, 2011)

Nordion (Canada) Inc.:

- Decision to amend nuclear substance processing facility operating licence – Abridged hearing (February 9, 2012)

Canadian Light Source Inc.:

- Decision to amend particle accelerator operating licence – Public hearing (June 8, 2011)

TRIUMF Accelerators Inc.:

- Decision to amend the TRIUMF particle accelerator operating licence – Abridged hearing (August 12, 2011)
- Decision to amend the TRIUMF Accelerators Inc. particle accelerator operating licence – Abridged hearing (November 28, 2011)
- Decision to renew (three-month extension) particle accelerator operating licence – Abridged hearing (January 26, 2012)

SLOWPOKE-2 Reactors

Dalhousie University:

- Decision to accept the issuance of a licence to abandon for the Dalhousie University SLOWPOKE-2 reactor facility – Abridged hearing (August 31, 2011)

University of Toronto:

- Decision to revoke the University of Toronto SLOWPOKE-2 reactor facility abandonment licence – Abridged hearing (February 24, 2012)

OPPORTUNITIES TO BE HEARD

Viterra Inc.:

- Decision to accept the redetermination of the Commission order issued on November 27, 2009 – Public hearing (August 11, 2011)

Health Canada:

- Decision to accept the opportunity to be heard on the designated officer order issued to Health Canada National Dosimetry Services on February 23, 2012, and dosimetry service licence amendment request – Abridged hearing (March 29, 2012)

REVOCATIONS

- Revocation of the current licence for the Madawaska Mine – Abridged hearing (July 28, 2011)

ANNEX B

REGULATORY FRAMEWORK PROJECTS PUBLISHED/ COMPLETED IN 2011 TO 12

Guide for Applicants and Intervenors Writing CNSC Commission Member Documents (GD-379)
(published March 29, 2012)

GD-379 provides guidance for writing Commission Member Documents (CMDs) for submission to the CNSC.

The document addresses the following aspects of writing an effective CMD:

- a brief overview of the hearing process
- guiding principles and points to remember
- writing tips (such as principles of plain language, and the use of visual aids)
- suggested format and order of information for a licensing decision CMD being prepared by an applicant or intervenor, so that externally submitted CMDs are in the same format as CNSC staff submissions
- preparing and filing a CMD presentation

Guidance on Safety Analysis for Nuclear Power Plants **(GD-310) (published March 28, 2012)**

GD-310 provides guidance on how to meet the requirements of RD-310, *Safety Analysis for Nuclear Power Plants*. GD-310 sets out the guidelines related to safety analysis, including the selection of events to be analyzed, acceptance criteria, safety analysis methods, and safety analysis documentation and review.

Management of Uranium Mine Waste Rock and Mill Tailings **(RD/GD-370) (published March 23, 2012)**

RD/GD 370 sets out the CNSC's requirements for the sound management of mine waste rock and mill tailings resulting from site preparation, construction, operation and decommissioning of new uranium mine or mill projects in Canada, to ensure the protection of the environment and the health and safety of people.

This regulatory document also provides guidance to applicants regarding the CNSC's expectations for new mining projects throughout Canada on the management of waste rock and tailings generated by uranium mining and milling operations.

This regulatory document is based on the discussion paper DIS 10 01, *Management of Uranium Mine Waste Rock and Mill Tailings*, which was posted for public consultation in 2010.

Public Information and Disclosure **(RD/GD-99.3) (published March 14, 2012)**

RD-99.3 sets out the CNSC's requirements related to public information and disclosure programs that are submitted by applicants and licensees of Class I and Class II nuclear facilities, and uranium mines and mills, for all lifecycle phases. The previous public information program required of licensees has been supplemented with a public disclosure protocol.

Discussion Paper: Process for Establishing Release Limits and Action Levels at Nuclear Facilities **(DIS-12-02) (published February 22, 2012)**

This discussion paper sets out a proposed methodology for consistent establishment of limits and action levels on environmental releases at Class I nuclear facilities, uranium mines and mills, and nuclear waste management facilities, to ensure the protection of the environment and health and safety of Canadians. The objective is to establish limits that minimize the overall quantity and concentration of contaminants released to the environment; this is to ensure that the *Canadian Environmental Protection Act*'s principles of pollution prevention and that the NSCA's principle of adequate precaution to control releases are respected.

***Discussion Paper: Protection of Groundwater at Nuclear Facilities in Canada* (DIS-12-01) (published February 17, 2012)**

This discussion paper sets out a proposed approach for providing direction to current nuclear facility licensees, as well as to new applicants, in Canada to ensure the protection of groundwater. Relevant facilities include Class I nuclear facilities, uranium mines and mills, and nuclear waste management facilities. The discussion paper proposes to consolidate, clarify and build on existing environmental protection requirements. Adoption of this proposed approach would provide future regulatory direction to nuclear facility licensees.

***Design, Testing and Performance of Exposure Devices* (RD/GD-352) (published January 25, 2012)**

RD/GD-352 provides design, testing and performance specifications for the design and testing of exposure device systems, including the remote control, the exposure device and projection sheath. The document also addresses the use of non-original equipment manufacturer components or accessories.

***Regulations Amending the Packaging and Transport of Nuclear Substances Regulations* (interim exemptions) (published December 22, 2011)**

The *Packaging and Transport of Nuclear Substances Regulations* (PTNSR) were amended to exempt the following items following their sale to end-users:

- check sources that contain a small, very low-risk quantity of nuclear substances
- radiation devices containing less than 10 times the exemption quantity (EQ) of a radioactive nuclear substance

Radiation devices containing more than 1 time the EQ of radioactive nuclear substances must be certified by the CNSC for use in Canada and this requirement will remain in effect. Manufacturers and distributors are not covered under these new exemptions, and will still be required to comply with the PTNSR.

These amendments have no impact on the environment, the health and safety of persons, and national security, given the low quantity of nuclear substances involved. These amendments conform to measures of control and international obligations to which Canada has agreed. The regulatory burden is lessened for the users of the exempted radiation devices or check sources, because of simplified requirements pertaining to the domestic transport of the exempted devices.

***Licence Application Guide: Nuclear Substances and Radiation Devices* (RD/GD-371) (published November 15, 2011)**

RD/GD-371, *Licence Application Guide – Nuclear Substances and Radiation Devices* provides guidance on how to complete and submit an application for a licence for nuclear substances and radiation devices, in accordance with the NSCA and its regulations.

***Licence Application Guide: Class II Isotope Production Accelerators* (RD/GD-289) (published November 14, 2011)**

RD/GD-289 provides interested applicants with information on how to complete and submit an application for a licence for Class II non-radiotherapy accelerator facilities, in accordance with the NSCA and its regulations.

***Licence Application Guide: Licence to Construct a Nuclear Power Plant* (RD/GD-369) (published August 29, 2011)**

GD-369 describes the structure and content for an application for a licence to construct an NPP. The document applies to applications for a licence to construct a water-cooled NPP.

GD-369 closely follows the format of the IAEA Safety Guide No. GS-G-4.1, *Format and Content of the Safety Analysis Report for Nuclear Power Plants*, but it is more specific to the Canadian context.

In following GD-369, applicants can submit the appropriate information to demonstrate that they are qualified, and will make adequate and reasonable provisions to undertake the activity to be licensed, pursuant to subsection 24(4) of the NSCA and associated regulations.

***Supplementary Information for Licensees: Aboriginal Consultation* (Web) (published August 9, 2011)**

Licensees of nuclear projects do not bear the Crown's legal obligation to consult Aboriginal peoples under section 35 of the *Constitution Act, 1982*. However, where appropriate, licensee engagement with Aboriginal groups is significant because consultation activities can inform and assist those of CNSC staff and help the CNSC make effective decisions.

This Web publication provides guidance to licensees and applicants on Aboriginal consultation.

***Licence Application Guide: Service Class II Prescribed Equipment* (RD/GD-207) (published June 7, 2011)**

Applicants are required to apply to the CNSC for a licence to service Class II prescribed equipment.

RD/GD-207 provides information on how an applicant can apply for the licence, including detailed instructions on the completion of the application form.

***Deterministic Safety Analysis for Small Reactor Facilities* (RD-308) (published June 7, 2011)**

RD-308 provides the requirements for deterministic safety analysis for small reactors. This regulatory document sets out the technical criteria against which the CNSC will review deterministic safety analysis for small reactors. These criteria will assure that adequate safety analyses are completed for the siting, construction, operation and decommissioning of these reactors, in accordance with defined regulatory requirements.

***Aging Management for Nuclear Power Plants* (RD-334) (published June 7, 2011)**

RD-334 sets out the CNSC's requirements for managing the aging of structures, systems, and components (SSCs) of an NPP. Aging management is the engineering, operational, inspection, and maintenance actions that control, within acceptable limits, the effects of physical aging and obsolescence of SSCs that occur over time or with use. An aging management program is a set of policies, processes, procedures, arrangements, and activities for managing the aging of SSCs.

***Design of Small Reactor Facilities* (RD-367) (published June 7, 2011)**

RD-367 provides applicants with the design requirements for new small reactors. The document identifies the overall safety objectives to be achieved, key safety concepts — such as the principle of defence-in- depth, and the consideration of multiple physical barriers and other important engineering principles. System-specific requirements will also be described. Recognizing that some requirements may not be relevant to all types of facilities, the document also includes an explanation of the graded approach.

These publications are available on the CNSC Web site at **nuclearsafety.gc.ca**.

nuclearsafety.gc.ca

VISIT THE CNSC'S WEB SITE FOR MORE INFORMATION ABOUT THE CANADIAN NUCLEAR SECTOR

On the CNSC's Web site, you'll find:

- more about the CNSC and its role in nuclear safety
- links to laws and regulations governing Canada's nuclear sector
- information about nuclear facilities in Canadian communities
- news releases and updates on important issues affecting the nuclear sector
- fact sheets on nuclear-related topics
- how to get involved in public hearings or environmental assessments
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